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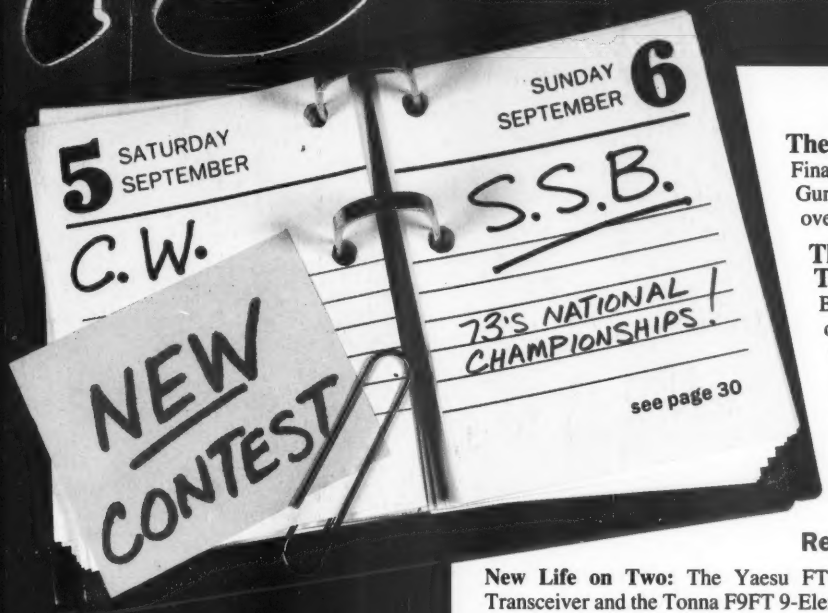

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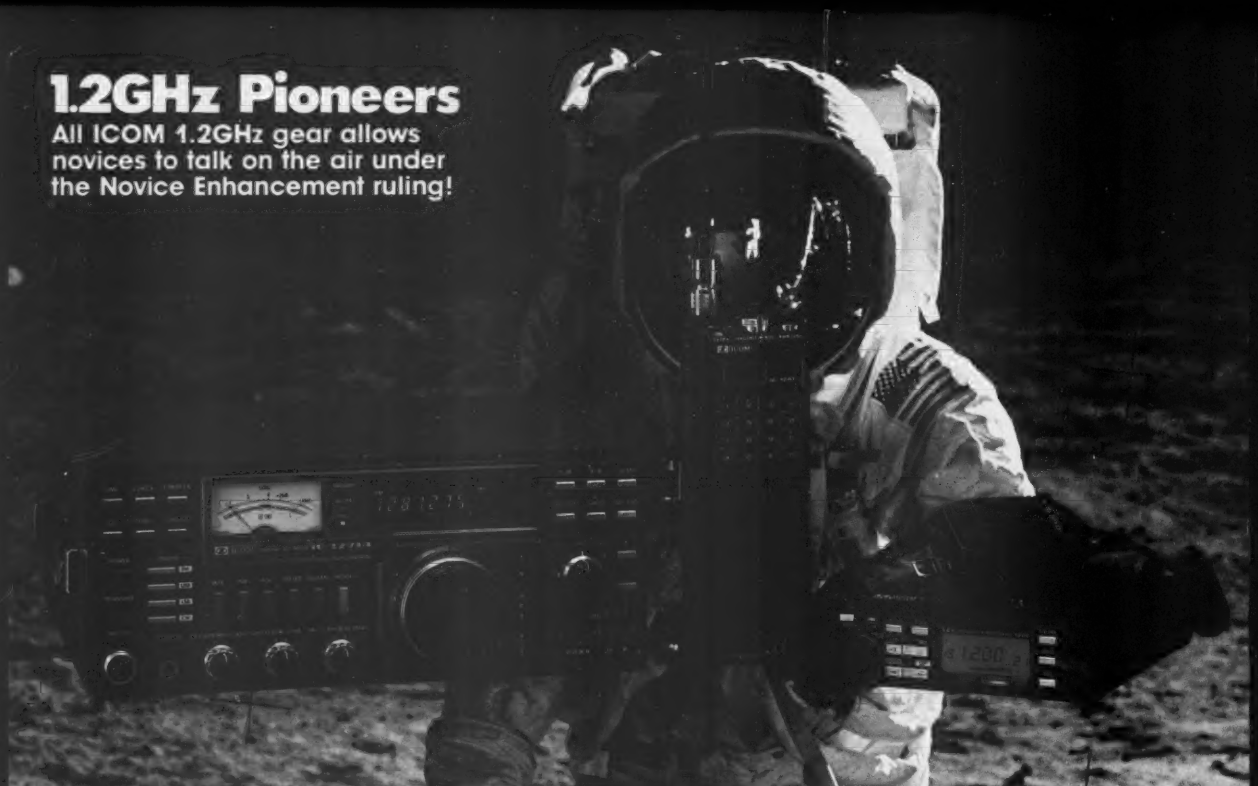
1.2GHz Pioneers

All ICOM 1.2GHz gear allows novices to talk on the air under the Novice Enhancement ruling!



ICOM 1.2GHz

THE ONLY 1.2GHz SYSTEM... ANYWHERE

- **IC-1271A Base Station**
- **IC-12AT Handheld**
- **NEW! IC-1200 Mobile**
- **IC-RP1210 Repeater**

Explore 1.2GHz with ICOM. Only ICOM offers the most complete line of ham gear for 1.2GHz...the IC-1271A full-featured base station transceiver, the IC-12AT handheld, the new IC-1200 mobile and the IC-RP1210 repeater. So, get away from the crowd and be a pioneer on 1.2GHz.

The IC-1271A 1240-1300MHz base station transceiver features 10 watts of RF output power, 32 memories, scanning and multi-mode operation including ATV (amateur TV).

A variety of options are available for the IC-1271A including the IC-EX310 voice synthesizer, UT-15S CTCSS encoder/decoder, IC-PS25 internal AC power supply, AG-1200 preamplifier and the TV-1200 TV interface unit.

TV-1200

The IC-12AT handheld covers from 1260-1299.990MHz, has ten memory channels, memory scan, program scan and programmable offset. It also features an LCD readout, RIT and VXO, 32 built-in tones and a DTMF pad.

The new IC-1200 1.2GHz mobile transceiver has 21 memory channels, scanning, an HM-14 up/down scanning mic, RIT, large LCD readout and 10 watts power output. Accessories include the PS-45 slim-line external power supply.

The IC-RP1210 completes your 1.2GHz system. It features a field programmable (198 channel, DIP switch), high stability PLL, repeater access to CTCSS, three-digit DTMF decoder for control of special functions, 10 watts, selectable hang time and ID'er.

ICOM

First in Communications

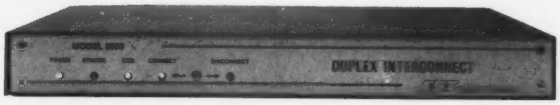
ICOM America, Inc., 2380-116th Avenue NE, Bellevue, WA 98004 **Customer Service Hotline (206) 454-7619**
3150 Premier Drive, Suite 126, Irving, TX 75063 / 1777 Phoenix Parkway, Suite 201, Atlanta, GA 30349
ICOM CANADA, A Division of ICOM America, Inc., 3071 - #5 Road, Unit 9, Richmond, B.C. V6X 2T4 Canada

All stated specifications are approximate and subject to change without notice or obligation. All ICOM radios significantly exceed FCC regulations limiting spurious emissions. 1.2GHz387

MODEL 8000 DUPLEX

- Desk top or rack mounted versions
- Pulse or fully regenerated tone dialing
- Full and half duplex operation
- Half duplex privacy mode
- Internally squelched audio
- Powerful toll call protection
- Secret toll override code
- ✱ up # down or multi-digit access
- Ringout
- End to end signalling (DTMF standard)
- Auto answer on 1st, 2nd, 4th or 8th incoming ring
- Mobile to mobile signalling
- Telephone initiated control mode
- Dip switch selectable hybrid compensation capacitance.
- Programmable timout and mobile activity timers with unique beeps
- Disconnect beep
- Separate repeat level control
- Lightning protection
- Connectors for options
- 10-16VDC powered

28 dip switches make all features user programmable and selectable.



OPTIONS

8001 ANI code validator (up to 1024 access codes)
8002 1000 call two tone signalling
8003 32 call CTCSS signalling
8004 FCC registered coupler
8005 Centralized computer billing system

NOW ANYONE CAN ENJOY FULL DUPLEX!

Merely connect a CSI Model 8000 to any duplex base (such as the Yaesu FT-2700RH) and presto. . . you have an instant full duplex mobile telephone system!

Or, the 8000 can be connected to any repeater for shared use. A landline caller can selectively call any mobile on the system with (end to end) regenerated DTMF (standard), CTCSS (optional) or two tone sequential (optional). Mobiles can even selectively call **each other**!

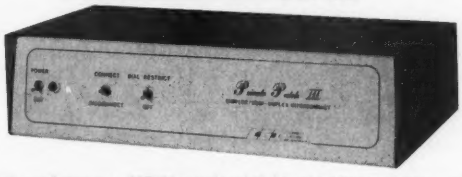
Knowing the correct code, a caller can **take control** of the 8000 from any touch phone and **voice communicate** with mobiles that are not equipped with touch dialers.

No other duplex patch offers so much for so little.

FIRST CLASS FEATURES and PERFORMANCE . . . COACH FARE!

MAKE YOUR MOBILE TELEPHONE SYSTEM FLY WITH A PATCH FROM CSI

PRIVATE PATCH III



A high performance VOX based patch for simplex systems and for operation through remotely located repeaters.

Thousands of Private Patch III's are in both amateur and commercial use worldwide. Private Patch III enjoys a reputation that is second to none.

CW ID and other powerful features make Private Patch III the best deal going in Vox Simplex phone patches!

MODEL CS-9500

For exemplary simplex performance, the CS-9500 control station interconnect incorporates a full ½ second of landline to mobile electronic voice delay. Voice delay assures compatibility with the slowest CTCSS or trunked repeater systems.

Attractively styled to complement any decor.

STANDARD FEATURES (Both models)

- Three simple connections to base radio
- Simplex operation (VOX, of course)
- Digital "fast VOX"
- Toll restrict
- Secret toll disable code
- Selectable tone or pulse dialing
- Automatic busy signal disconnect
- Control interrupt timer (maintains positive control in simplex mode)
- Three digit access code (eg. ✱ 73)
- Ringout (reverse patch)
- Ringout inhibit if channel is in use
- Lightning protectors
- Spare relay position
- 110VAC supply
- And much more

OPTIONS: 12 VDC or 230 VAC power
FCC registered coupler

CONNECT SYSTEMS INC.
23731 Madison St.
Torrance CA 90505
Phone: (213) 373-6803

CIRCLE 12 ON READER SERVICE CARD

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ERICKSON COMMUNICATIONS Chicago IL
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HENRY RADIO Los Angeles CA
INTERNATIONAL RADIO SYSTEMS Miami, FL
JUNS ELECTRONICS Culver City CA
MADISON ELECTRONICS SUPPLY Houston, TX
MIAMI RADIO CENTER CORP. Miami FL
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COM-WEST RADIO SYSTEMS LTD. Vancouver, BC

12

The Nicest Things Come In Small Packages.

The SS-32HB is a new hybrid sub-audible encoder plucked from Communications Specialists' Hothouse. It has grown through a cross of the time tested SS-32, the subminiature SS-32M and space age micro circuitry. This programmable 32 tone encoder measures a scant .5 x 1.0 x .15 inches; no small wonder it allows the addition of continuous tone control to a bunch of hand held transceivers that lack space.

Why not snip your problems in the bud, with our fast, one day delivery and attractive one year warranty.

$29.95 each

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CIRCLE 10 ON READER SERVICE CARD

MFJ ACCESSORIES

MFJ's BEST 300 WATT TUNER HAS A CROSS-NEEDLE METER THAT READS SWR, FORWARD AND REFLECTED POWER – ALL AT A GLANCE.

MFJ-949C
$149.95

MFJ's best 300 watt tuner is now even better! **The MFJ-949C all-in-one Deluxe Versa Tuner II** gives you a tuner, cross-needle SWR/Wattmeter, dummy load, antenna switch and balun in a compact cabinet. You get quality conveniences and a clutter-free shack at a super price.

A cross-needle SWR/Wattmeter gives you SWR, forward and reflected power -- all at a single glance. SWR is automatically computed with no controls to set. Has 30 and 300 watt scale on easy-to-read 2 color lighted meter (needs 12 V).

A handsome black brushed aluminum cabinet matches all the new rigs. Its compact size (10 x 3 x 7 inches) takes only a little room.

You can run full transceiver power output -- up to 300 watts RF output -- and match coax, balanced lines or random wires from 1.8 thru 30 MHz. Use it to tune out SWR on dipoles, vees, long wires, verticals, whips, beams and quads.

A 300 watt 50 ohm dummy load gives you quick tune ups and a versatile six position antenna switch lets you select 2 coax lines (direct or thru tuner), random wire or balanced line and dummy load.

A large efficient airwound inductor -- 3 inches in diameter -- gives you plenty of matching range and less losses for more watts out. 100 volt tuning capacitors and heavy duty switches give you safe arc-free operation. A 4:1 balun is built-in to match balanced lines.

Order your convenience package now and enjoy.

MFJ 12/24 HOUR LCD CLOCKS

MFJ-108 $19.95 **MFJ-107 $9.95**

Huge 5/8 inch bold black LCD numerals make these 24 hour LCD clocks a must for your ham shack. Choose from a dual clock that displays UTC and local time or the single unit that displays 24 hour time.

Mounted in a brushed aluminum frame, these clocks feature 5/8 inch LCD numerals and a sloped face for easy across the room reading. Both also feature easy set month, day, hour, minute and second functions that can be operated in an alternating time-date display mode. MFJ-108, 4½x1x2 inches; MFJ-107, 2¼x1x2 inches. Battery included.

MFJ-962B VERSA TUNER III

MFJ-962B $229.95

Run up to 1.5KW PEP and match any feedline continuously from 1.8 to 30 MHz: coax, balanced line or random wire.

Lighted Cross-needle Meter reads SWR, forward and reflected power in one glance. Has 200 and 2000 watt ranges. 6 position antenna switch handles 2 coax lines, random wire and balanced lines. 4:1 balun. 250 pf, 6 kv variable capacitors. 12 position ceramic Inductor switch. Smaller size matches new rigs: 10¾ x 4½ x 14 7/8 inches. Flip stand for easy viewing. Requires 12V for light.

MFJ RANDOM WIRE TUNER

MFJ-16010
$39.95

MFJ's ultra compact 200 watt random wire tuner lets you operate all bands anywhere with any transceiver using a random wire. Great for apartment, motel, camping. Tunes 1.8-30 MHz. 2x3x4 inches.

REMOTE ACTIVE ANTENNA

54 inch remote active antenna mounts outdoor away from electrical noise for maximum signal and minumum noise pickup. Often outperforms long-wire hundreds of feet long. Mount anywhere-atop houses, buildings, balconies, apartments, ships.

Use with any radio to receive strong clear signals from all over the world. 50 KHz to 30 MHz. High dynamic range eliminates intermodulation. Inside control unit has 20 dB attenuator, gain control. Switch 2 receivers and auxiliary or active antenna. "On" LED. 6 x 2 x 5 in. 50 ft. coax. 12 VDC or 110 VAC with MFJ-1312, $9.95.

MFJ-1024
$129.95

CROSS-NEEDLE SWR/WATTMETER

MFJ-815
$59.95

MFJ's cross-needle SWR/Wattmeter gives you SWR, forward and reflected power -- all at a single glance! SWR is automatically computed -- no controls to adjust. Easy-to-use push buttons select three power ranges that give you QRP to full legal limit power readings. Reads 20/200/2000 W forward, 5/50/500 W reflected and 1:1 to 1:5 SWR on easy-to-read two color scale. Lighted meter needs 12 V. ±10% full scale accuracy. 6½x3¼x4½ inches.

COMPACT SPEAKER

MFJ-280 $18.95

Mobile speaker. Tilt bracket on magnetic base. 3½ mm phone plug. Use with 8 and 4 ohm impedances. Handles 3 watts audio.

HANDHELD TELESCOPING ANTENNAS WITH BNC

MFJ-1710, $9.95, 3/8 wave 2 meter. Pocket clip. 5¾" - 24½".

MFJ-1712, $14.95, ¼ wave 2 meter; 5/8 wave 440 MHz. 7¼" - 19".

MFJ-1714, $16.95, ½ wave 2 meter. End-fed halfwave dipole. Shorter, lighter, more gain, less stress than 5/8 wave mounted on handheld. When collapsed it performs like rubber duck.

MFJ "DRY" DUMMY LOADS

MFJ-262
$64.95

MFJ-260
$26.95

MFJ's "Dry" dummy loads are air cooled -- no messy oil. Just right for tests and fast tune up. Non-inductive 50 ohm resistor in aluminum housing with SO-239. Full load to 30 seconds, de-rating curve to 5 minutes. **MFJ-260 (300 watt),** SWR 1.1:1 -30 MHz, 1.5:1, 30-160 MHz, 2½x2½x7 inches. **MFJ-262 (1 KW),** SWR 1.5 :1-30 MHz. 3x3x13.

MFJ DELUXE ELECTRONIC KEYER

MFJ-407B
$69.95

MFJ-407B Deluxe Electronic Keyer sends iambic, automatic, semi-auto. or manual. Use squeeze, single lever or straight key. Plus/minus keying. 8-50 WPM. Speed, weight, tone, volume controls. On/Off. Tune. Semi-auto switches. Speaker. RF proof. 7x2x6 inches. Uses 9 V battery. 6-9 VDC or 110 VAC with AC adapter, MFJ-1305, $9.95.

ANTENNA CURRENT PROBE

MFJ-206 $79.95

MFJ Antenna Current Probe lets you monitor RF antenna currents -- no connections needed! Determine current distribution, RF radiation pattern and polarization of antennas, transmission lines, ground leads, building wiring, guy wires and enclosures.

- **Determine if ground** system is effective.
- **Pinpoint RF leakage** in shielded enclosures.
- **Locate best place** for mobile antenna.
- **Use** as tuned field strength meter.
- **Indicate transmission line radiation** due to high SWR, poor shielding, antenna unbalance.
- **Detect re-radiation** from gutters, guy wires that can distort antenna field patterns.

Monitors RF current. 1.8-30 MHz. Has sensitivity, bandswitch, tune controls, telescoping antenna for field strength meter. 4x2x2 inches.

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CIRCLE 24 ON READER SERVICE CARD

NEVER SAY DIE

IF MORSE CODE MAKES YOU CRAZY

While most of the Extra-class hams I know quite clearly qualify for admission to the nearest funny farm, I got to wondering about a few Extras who seemed just peculiar, but not really off-the-wall crazy. Could there possibly be a hole in my theory that Morse code at 20 wpm burns out the sanity links in the brain?

In-depth interviews with several seemingly semi-rational Extras uncovered a dimension I'd failed to consider. It turns out there was, in the past, a way to get the Extra license without blowing the brain's fuses.

In every single case, the seemingly semi-rational Extra-class licensees admitted to using the Bash System to get their ticket and related funny call. It appears that with the Bash System there was no need to learn the code at all since Bash provided the exact copy for the FCC-run code exams. All one had to do was copy it down while the code was playing.

You know, I never thought amateur radio would have a reason to thank Dick Bash for his most lucrative work. Bash did open the flood gates for a while, enabling tens of thousands of people to get their ham tickets with virtually no understanding of either theory or code. Alas, the VEC program scuttled Dick's cheat-sheet empire.

Have you noticed what a high percentage of Extras wear camouflage socks? Sure sign.

Is it too late to nominate Dick for the Ham Of The Year award? Perhaps the Ham of Yesteryear.

QSL OF THE MONTH

To enter your QSL, mail it in an envelope to *73*, WGE Center, 70 Rte. 202 N., Peterborough NH 03458, Attn: QSL of the Month. Winners receive a one-year subscription (or extension) to *73*. Entries not in envelopes cannot be accepted.

GOING DIGITAL

The telephone companies have been digitizing voice in order to cram more conversations over their wires for over 25 years. These days many telephone switching systems automatically digitize voices for efficient handling and then convert them back to analog again.

Have you ever heard a digitized voice circuit on a ham band? I haven't. I don't even recall seeing any articles on the subject in a ham magazine. I realize that most of you are getting old and are too tired to bother experimenting with new technologies, but after twenty-five years, how about at least experimenting with what's by now an old technology?

We hams are supposed to be the leaders—the pioneers—hell, it's in our rules! Yes, I know, Incentive Licensing knocked the stuffing out of our hobby 24 years

Continued on p. 10

QRM

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KENWOOD

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"DX-cellence!"

TS-940S

The new TS-940S is a serious radio for the serious operator. Superb interference reduction circuits and high dynamic range receiver combine with superior transmitter design to give you no-nonsense, no compromise performance that gets your signals through! The exclusive multi-function LCD sub display graphically illustrates VBT, SSB slope, and other features.

- **100% duty cycle transmitter.** Super efficient cooling system using special air ducting works with the internal heavy-duty power supply to allow continuous transmission at full power output for periods exceeding one hour.
- **High stability, dual digital VFOs.** An optical encoder and the flywheel VFO knob give the TS-940S a positive tuning "feel."
- **Graphic display of operating features.** Exclusive multi-function LCD sub-display panel shows CW VBT, SSB slope tuning, as well as frequency, time, and AT- 940 antenna tuner status.
- **Low distortion transmitter.** Kenwood's unique transmitter design delivers top "quality Kenwood" sound.
- **Keyboard entry frequency selection.** Operating frequencies may be directly entered into the TS-940S without using the VFO knob.
- **QRM-fighting features.** Remove "rotten QRM" with the SSB slope tuning, CW VBT, notch filter, AF tune, and CW pitch controls.
- **Built-in FM, plus SSB, CW, AM, FSK.**
- **Semi or full break-in (QSK) CW.**
- **40 memory channels.** Mode and frequency may be stored in 4 groups of 10 channels each.
- **Programmable scanning.**
- **General coverage receiver.** Tunes from 150 kHz to 30 MHz.
- **1 yr. limited warranty.** Another Kenwood First!

Optional accessories:
• AT-940 full range (160-10m) automatic antenna tuner • SP-940 external speaker with audio filtering • YG-455C-1 (500 Hz), YG-455CN-1 (250 Hz), YK-88C-1 (500 Hz) CW filters; YK-88A-1 (6 kHz) AM filter • VS-1 voice synthesizer • SO-1 temperature compensated crystal oscillator • MC-43S UP/DOWN hand mic. • MC-60A, MC-80, MC-85 deluxe base station mics. • PC-1A phone patch • TL- 922A linear amplifier • SM-220 station monitor • BS-8 pan display • SW-200A and SW-2000 SWR and power meters.

Complete service manuals are available for all Kenwood transceivers and most accessories.
Specifications and prices are subject to change without notice or obligation.

More TS-940S information is available from authorized Kenwood dealers.

KENWOOD

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P.O. Box 22745, Long Beach, CA 90801-5745

KENWOOD

pacesetter in Amateur radio

220 MHz TH-315A Coming Soon!

This HT Has it All!

TH-215A/315A/415A

Full-featured Hand-held Transceivers

Kenwood brings you the greatest hand-held transceiver ever! More than just "big rig performance," the new TH-215A for 2 m and TH-415A for 70 cm pack the most features and the best performance in a handy size. And our full line of accessories will let you go from ham-shack to portable to mobile with the greatest of ease!

- **Wide receiver frequency range.** Receives from 141-163 MHz. Includes the weather channels! Transmit from 144-148 MHz. Modifiable to cover 141-151 MHz (MARS or CAP permit required).
- **TH-415A covers 440-449.995 MHz.**
- **5, 2.5, or 1.5 W output, depending on the power source.** Supplied battery pack (PB-2) provides 2.5 W output. Optional NiCd packs for extended operation or higher RF output available.
- **CTCSS encoder built-in.** TSU-4 CTCSS **decoder** optional.
- **10 memory channels store any offset, in 100-kHz steps.** Each memory channel can store frequency, frequency step, offset, **reverse switch position,** and CTCSS frequency.
- **Nine types of scanning!** Including new **"seek scan"** and **priority alert.**
- **Intelligent 2-way battery saver circuit extends battery life.** Two battery-saver modes to choose, with power save ratio selection.
- **Easy memory recall.** Simply press the channel number!
- **12 VDC input terminal for direct mobile or base station supply operation.** When 12 volts is applied, RF output is 5 W!
- **New Twist-Lok Positive-Connect™ locking battery case.**
- **Frequency entry by keyboard or UP/DWN keys.**
- **Priority alert function.**
- **Monitor switch to defeat squelch.** Used to check the frequency when CTCSS encode/decode is used or when squelch is on.
- **Large, easy-to-read multi-function LCD display with night light.**
- **Audible beeper to confirm key-pad operation.** The beeper has a unique tone for each key. DTMF monitor also included.
- **Supplied accessories:** Belt hook, rubber flex antenna, PB-2 standard NiCd battery pack (for 2.5 W operation), wall charger, dust caps.

Optional Accessories:

• PB-1: 12 V, 800 mAH NiCd pack for 5 W output • PB-2: 8.4 V, 500 mAH NiCd pack (2.5 W output) • PB-3: 7.2 V, 800 mAH NiCd pack (1.5 W output) • PB-4: 7.2 V, 1600 mAH NiCd pack (1.5 W output) • BT-5 AA cell manganese/alkaline battery case • BC-7 rapid charger for PB-1, 2, 3, or 4 • BC-8 Compact battery charger • SMC-30 speaker microphone • SC-12, 13 soft cases • RA-3, 5 telescoping antennas • RA-8B StubbyDuk antenna • TSU-4 CTCSS decode unit • VB-2530: 2m, 25 W amplifier • LH-4, 5 leather cases • MB-4 mobile bracket • BH-5 swivel mount • PG-2V DC cable • PG-3C cigarette lighter cord with filter

Complete service manuals are available for all Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

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QRX . . .

And The Winner Is . . .

DAVID LaFLEUR KA1MAF is the winner of *73*'s **Instant ICOM Sweepstakes.** Dave's card was drawn from over 15,000 entries at the Dayton Hamvention. Wayne W2NSD plucked the lucky card out of the barrel (see the photo). As you read this, Dave is tuning up an ICOM dream station consisting of: an IC-735 all-band, all-mode, 100-Watt HF transceiver/general-coverage receiver; a PS-55 switching power supply: an SM-10 desk microphone with built-in graphic equalizer; an AT-150 automatic antenna tuner; and a GC-5 world clock to keep track of all the hours he spends with his new station. Dave writes: "I was really surprised that I won this station. I just sent in a couple of entries. I've been putting off working on getting my General license, but now that I've got something new to use it's time to start working on it." *73* would like to congratulate KA1MAF and thank ICOM America, Inc., for making it all possible. Keep an eye out for more *73* sweepstakes—you could be our next big winner.

W2NSD draws the winner of the Instant ICOM Sweepstakes.

Free Lunch

HAMS ARE CHEAP. But even the stingiest ham recognizes a deal when he sees one. If you enter the *73*/ICOM Golden Gigahertz Contest you will receive a free hat and T-shirt, courtesy of ICOM. If you want to see what they look like, take a gander at what Wayne is wearing on last month's cover. No strings attached, no minimum score, no tricks. Your total investment is 22¢ for the stamp plus wear-and-tear on your pencil. See the complete rules on page 23 and fill out the coupon. Then we'll see you on 1.2 GHz on July 13–14.

Novice World

ICOM IS PUBLISHING a newletter called *Novice World* which is aimed at building the confidence of new Novices and getting them on the air with a minimum amount of trouble. The first issue covers an explanation of Novice Enhancement, tells you how to set up your first station, gives you step-by-step instructions on what to say during that first QSO, explains what some of the bells and whistles on modern equipment do, lists the propagation characteristics of the various amateur bands, tells you how to construct a dipole, and gives you a quick-reference Novice frequency allocation chart. *Novice World* assumes that you have no real *practical* knowledge of ham radio, and this "let's start from the beginning" tone is what a lot of Novices have been searching for. ICOM is currently the leader in providing equipment for the "Enhanced Novice," and *Novice World* is an attempt to further solidify that position. The text is sprinkled with references to ICOM's full line of gear for the Novice, but the sales pitch is low-key and explanations of basic practices and technical matters are brandless. *Novice World* is FREE and to get it all you have to do is write to: ICOM's *Novice World*, c/o ICOM America, Inc., 2380 116th Avenue NE, Bellevue WA 98004.

It's Big

AS PROMISED last month in QRX, details of *73*'s new contests, **The National Championships (September 5–6),** are available on page 30. We've finally made it possible for the "Little Gun" to have a chance at winning—using guile instead of gigawatts. The rules are complicated, so read them carefully and devise a strategy. For a complete set of entry forms, send a SASE to The National Championships, 2665 Busby Road, Oak Harbor WA 98277.

A Few Good OMs/YLs

***73*'s CONTEST PROGRAM** is rapidly expanding (as you may have noticed from the preceding two stories). We have immediate openings for a contest chairman, an awards manager, and a public relations manager. If you are interested in becoming part of *73*'s contest coordination team, drop a note to Bill Gosney KE7C, 2665 Busby Road, Oak Harbor WA 98277.

Scout Skeds

BOY SCOUTS AND GIRL GUIDES from the province of Ontario will be exposed to amateur radio at **Future Challenge '87,** a one-week program of high-tech experiences designed to allow our youth to experience this very important aspect of their future. Future Challenge '87 will be held from August 16–23 at Conestoga College in Kitchener, Ontario. The Future Challenge '87 ham station will operate as VE3SHQ using all bands and modes; the packet system can be reached @ VE3EUK. The organizers would like amateurs to contact VE3SHQ to encourage the Scouts/Guides to explore the world of amateur radio. If you'd like to set up a sked, write to: Future Challenge '87, c/o Gerry Curry VE3MAX, RR #1, Millgrove, Ontario L0R 1V0 Canada.

Summertime

VISITORS to the offices of *73* are always welcome, and because we're located in such a beautiful vacation spot, faithful readers start dropping by once the weather warms up. Work on our new $7.3 million visitor center continues on schedule, but we appear to be

having some trouble getting the full-size replica of Victoria Falls to work. But seriously, folks, we've just put together a brand-spanking-new, state-of-the-art station, and if you want to drop by and operate for a few minutes with a signal that'll knock your socks off, come on up. Don't drive all the way from Dubuque just for our five-minute tour, but if you're in the area, please stop on in. In the photo you can see our new Sommer multiband HF beam being hoisted into place. Five minutes after this photo was taken it was discovered that the thrust bearing at the top of the tower was just a little tiny bit too small.

PO Boxing

KENWOOD USA has moved. Yeah, yeah, I know we told you that last month, but since then the U.S. Postal Service has informed Kenwood that the address Kenwood has been giving out is incorrect. The correct mailing address for Kenwood is: Kenwood USA Corporation, PO Box 22745, Long Beach CA 90801-5745.

Smoking Gunns

CHUCK HOUGHTON WB6IGP called to say that those of you who are searching for **Gunn diodes for 10 GHz** need look no further. Chuck, the author of *73*'s ongoing "Microwave Building Blocks" series of articles, says that he has a large supply of these diodes and he'll part with them for the ridiculously low price of $5 each postpaid.

What new station would be complete without a new tower and antenna system. W2NSD's latest toy is a Sommer multiband HF beam sixty feet up.

Address

WE'VE RECEIVED a request from a reader who is having trouble getting in touch with one of our authors. **James L. Patterson DA1GY/KB5LF**, author of "CB to Six" in the February, 1985, issue, is apparently no longer at the address listed in his article. If anyone knows his current whereabouts, please send that information to: *73* Magazine, WGE Center, Peterborough NH 03458, Attn: QRX. We'll pass it along.

Chuck Update

CHARLES E. MARTIN F/AB4Y, former *73* staffer whom we last heard from as **C90A** in Maputo, has surfaced in Paris. Chuck is editor of *The Bugle*, newletter of the **Paris International Amateur Radio Association.** If you're going to be in Paris, drop a note to: Chuck Martin, CPU A-316, APO NY 09777.

Keep 'em Coming

PLEASE SEND your news stories and photos to *73* Magazine, WGE Center, Peterborough NH 03458, Attn: QRX.

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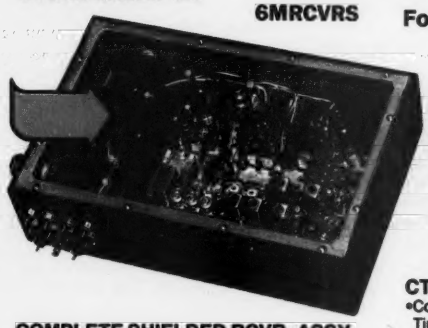

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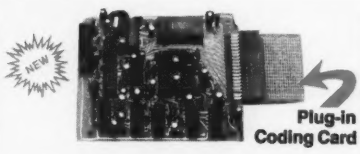

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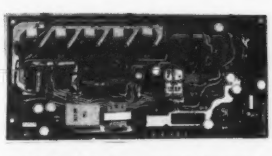

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CIRCLE 51 ON READER SERVICE CARD

NEVER SAY DIE

from page 4

ago and we haven't come up with anything much of value since. Pity, for before that we were on one heck of a roll—with FM, NFM, SSB, DSB, circular polarization, parametric amplifiers, flying noise lock, SSTV, a rash of RTTY developments, moonbounce, meteor scatter, and so on. We made smoke in the 50s.

On the one hand as I tune the bands I hear you griping up a storm over the rotten QRM, bitching and moaning about the mess on 20 meters, grumbling about lists, pileups, and contests. On the other we have zillions of megahertz completely unused in our microwave bands—our 50-MHz band is almost vacant—we are using 220 MHz so little Uncle Charlie wants to give 40% of it away to the first group that asks for it. We have several technologies we could develop to greatly reduce interference on our few crowded bands—such as double sideband with synchronous detection, a technology which should allow us to accommodate about ten times as many voice contacts in a given band. Until we know more about digital voice we don't know how many contacts we might be able to squeeze using it, but the estimate is another ten times—and with much less QRM than today.

By breaking voice communications down into phonetics and using a digital code for each phonetic, the Japanese have been able to store a surprising amount of voice on a compact disc. Make a wild guess as to how many hours of voice they're able to put on a CD. Make a guess. Sorry—you didn't even come close. They're putting 14-months of 24-hour-a-day voice on one disc. Using this technology we may be able to narrow a voice band to 25 Hz. This would allow us to have 100 times as many contacts in the same band, yet with far less QRM.

About the only thing we know for sure is that we are 24 years behind in technology instead of leading it, as our rules suggest we do—and as we were doing until 24 years ago. SSB was developed by hams—was pioneered by hams—and then, after hams demonstrated what it could do, it was finally accepted by the military. That was 30 years ago—almost time to stop bragging about it.

With pulse-code-modulation (PCM) so widely used in telephones, we can easily get the PCM chips we need to see what we can do about at least moving amateur radio up into the 70s. Now they've got adaptive differential PCM (ADPCM) chips which exploit the predictive behavior of analog speech and cut the transmission rate in half. So, while voice technology is moving ahead, here we are, still grabbing our mikes, just as we did 60 years ago, and cursing the QRM. We're as stick-in-the-mud about holding onto ancient voice technologies as we are with the code. Amateur radio has become an amusing window on the past—a museum piece. Yes, horse-and-buggy communications still exist . . . just while GE, Motorola and the other destroyers circle our sinking ship.

THE USUAL BAD NEWS

The old cliche that good news doesn't sell papers seems to guide the ham newsletters—or is it that there just isn't much good news to report?

For example, a recent *W5YI Report* included such lovely items as the Los Angeles ham who's made a career out of broadcasting obscene language over a local repeater—a ham arrested for jamming an FBI repeater—and the March licensing statistics.

The arrested ham, I'm sure all Morse-code fanatics will be excited to learn, was Extra class—further bolstering the growing concern that code makes people crazy and high-speed code makes them extra crazy. A well-known psychologist has been researching amateur radio for several years attempting to refute this proposition, but so far he has not been able to find any provable exceptions. As he said when interviewed recently, a visit to Dayton would completely convince even the most demanding skeptic.

"Hey, what's that odd noise? Hmmm, might be RTTY or SSTV . . . let's jam it, just in case."

check out 20 meters—the low end for code and the high end for a caterwauling of voices. I'm looking for smoke signals around 14.250. Hey, what's that odd noise? Hmmm, might be RTTY or SSTV . . . let's jam it, just in case.

Surely, out of the almost 150,000 amateurs who we think are still even slightly active, we must have one somewhere who's been trying out some digital voice. How about it? Is there one?

How do you feel about all this? Should I stop grumbling and just tell you how great you are? How wonderful our hobby is? What a fantastic job we do in handling emergencies? How up to 25 years ago we were on top of everything? Or are you interested in articles on new technologies? Would you actually read an article on a PCM unit? On an ADPCM? I can write a lot more about digital audio tape (DAT), if you're even remotely interested. Would you prefer me to lead the orchestra as our ship sinks—or work like hell to get the pumps going? It's your call—you tell me what you want.

I think I know the answer, so I'm looking for a nice baton to wave

The March FCC licensing statistics showed that amateur radio was, just before the Novice Enhancement announcement, still in a tailspin. In comparing the number of new Novices in March 1985, 1986 and 1987, the FCC figures showed that they dropped 20% in 1986 over 1985, but were down an astounding 50% in 1987 over 1986!

Well, what about Novice upgrades? 94% upgraded in 1986, while only 43% upgraded in 1987. An anomaly, right? No, it seems a consistent pattern. The percentage of Technicians who upgraded in 1986 was 84% vs. an incredible 37% in 1987. The Generals dropped from 90% upgrades in 1986 to 41% this year; Advanced was 39% this year and overall the drop was from 91% in 1986 to 41% in 1987. Got the picture?

So there you have it—the number of new licensees dropped to half of last year and the number of upgrades was only 41% of last year. Even the most optimistic Pollyannas have to admit that something's wrong.

BAD LANGUAGE

This business of insisting that the FCC define the limits of bad language is an exercise in pedantry. Just as there is no way to exactly define "quality"—there is no way to exactly pin down bad language and bad taste. Yet, like quality, we sure know it when we see it—or hear it.

Of course one of the problems involved with defining bad language has to do with the leaping upon definitions by fanatics—zealots. There's no way to satisfy a fanatic. Hell, I get angry letters from readers who object to "hell" in my editorials. They get offended by words which long ago have been admitted to family reading.

On the other end of the spectrum are fanatics who insist on exercising their so-called First Amendment Rights to make assholes of themselves on the air and, in the process, offending the hell out of almost everyone listening.

My suggestion is this—if you have someone in your community who is a consistent offender of your sensibilities, why not gather a group of the offended and visit the offendee? You'd sure get together to help some ham who needed help for some other reason—such as a handicapped ham, right? So why not get a group to work for the good of your local community?

Some hams offend us on the air as a way to get attention—others don't know any better . . . or don't care. The two hams I know of who were arrested, convicted, and put in prison for bad language on the air were both Extra-class hams, so I suppose they might have a legitimate excuse—the code made them crazy.

Fortunately most Extras can be spotted by their weird calls—and avoided. Perhaps someone should petition the FCC to make it illegal for an Extra to retain a normal call, preventing him from hiding his shame in sheep's clothing, so to speak.

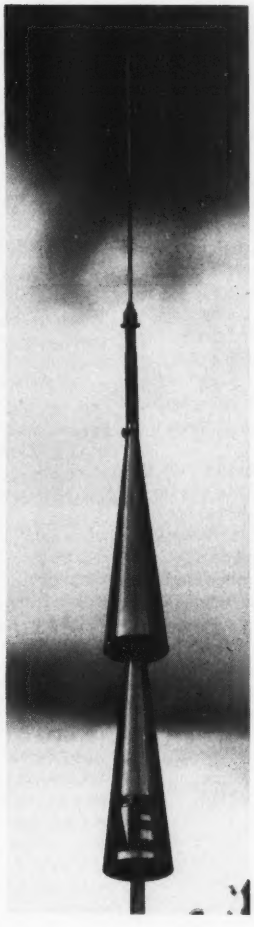
One aspect which should be researched is whether the brains of Extra-class hams who lose their ability to copy code through neglect ever return to any semblance of normal. Does high-speed Morse permanently scramble the brain, or can the brain, if left alone, repair itself in time?

Continued on page 55

Put More Punch in Your Packet

Outstanding mechanical design makes the IsoPole the only logical choice for a VHF base station, especially for Packet operation. All Isopole antennas yield the **maximum gain attainable** for their respective lengths and a maximum signal on the horizon. Exceptional decoupling from the feed line results in simple tuning and a significant reduction in TVI potential. The IsoPole antennas are all impedance matched in the factory so that no field tuning is required. The IsoPoles have the broadest frequency coverage of any comparable VHF base station antenna. This means no loss of power output from one end of the band to the other, when used with SWR protected solid state tranceivers. **Typical SWR is 1.4 to 1 or better across the entire band.**

A standard 50 Ohm SO-239 connector is recessed within the base sleeve (fully weather protected). With the IsoPole you will not experience aggravating deviation in SWR with changes in weather. The impedance matching network is weather sealed and designed for maximum legal power. The aerodynamic cones are the only appreciable wind load and are attached directly to the support (a standard TV mast which is not supplied).



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For either base station or hand-held operation AEA has the perfect VHF/UHF antenna. Put more punch in your Packet station with an AEA IsoPole or Hot Rod antenna. To order your new antenna contact your favorite Amateur Radio Distributor. For more information contact Advanced Electronic Applications, P.O. Box C-2160, Lynnwood, WA 98036, or call 206-775-7373.

IsoPole Specifications

Model	144	220	440
Freq. Coverage (Mhz)	135-160	210-230	415-465
2.1 VSWR bandwidth	›12Mhz @ 146Mhz	›15Mhz @ 220Mhz	›22Mhz @ 435Mhz
Power Rating	1 kw	1 kw	1 kw
Gain**	3 dbd	3 dbd	3 dbd
Radiating Element Length	125.5" (3.2m)	79.25" (2m)	46" (1.2m)
Amateur Net Price	$49.95	$49.95	$69.95

**dbd — db gain over a dipole in free space

Prices and Specifications subject to change without notice or obligation.

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CIRCLE 65 ON READER SERVICE CARD

LETTERS

AVAST, YE HAMS

I have been active on the ham bands for ten years, never transmit obscenities, music, or business there, and am well thought of as an operator, from what I hear. There's only one problem: I don't have a license. Never have and never will.

I've been a bootlegger since I was fifteen, and I like being a bootlegger. I don't have to fool with QSL cards, I don't know a single character of Morse, and I do not have to perpetuate a fraud: that amateur radio is a public service.

Furthermore, if by chance the Rooskies or a home-grown Idi Amin takes over (yes, Virginia, it can happen here), I will not be be rounded up and shot as a potential spy or subversive. Finally, if the FCC nails me on one of my SWBCB pirate broadcasts, I have no ticket to pull.

There are a lot more like me. At least twenty percent of the people I work aren't in the *Callbook*. (Yes, I have one. And I know better than to work as W1AW, K7UGA, W6SAI, or anyone else in there.)

Let's face it: making people learn Morse these days is like requiring airline pilots to demonstrate the ability to lash the valves and time the mag on an OX-5. That's why we're bootleggers.

I am not so dumb as to believe that there are not all sorts of blue- and brown-nosers out there who would like to bust me. Somewhere out there is a League-Of-Decency type with a surplus ADF just waiting to get me in trouble—but I'm prepared. Even though I'm the very model of decorum, I never transmit from my house and I use different calls, as needed. Incidentally, I found your articles a few years back on busting jammers and other assholes quite useful.

Maybe I'll see you on 40—but don't expect a QSL card.

The Olathe Buccaneer
West of Olathe KS

It's always nice to hear that our articles are helping people out. Your assessment of ham radio's problems is largely correct—Morse code is an unnecessary obstacle to licensing and our public service responsibilities are being ignored—but whether these faults justify breaking the law is your decision. . . and your risk. However, if you're as good an operator as you claim to be, I'm not going to turn you in. —KA1MPL

SCOFFLAWS

I feel that responsible editors and publisher of ham radio magazines should 100% support lawful and legitimate ham radio operations. In a democracy, a citizen has a responsibility to obey laws and if he does not agree with them he is perfectly entitled to protest and to work for legitimate and legal changes through the system.

The word for those who do as KW1O proposed ("Have a Nice Day," Letters, December, 1986) is scofflaws. I hope that not one of our ham radio leadership will place himself above the law and promote unlawful activity.

By staying within the law ham radio has prospered over the years, and as far as I know, very few have profited by unlawful opposition to the rules of the game.

Joe Mehaffey K4IHP
Atlanta GA

KW1O went beyond the bounds of propriety in encouraging an individual to become a bootlegger, but I think that editors have a duty to write the truth as they see it, not as the law defines it. We also have a responsibility to provoke thought and promote change, when we think it is necessary. I think you left your description of a how a democracy works unfinished: If, after protests and attempts for "legitimate and legal change" fall on deaf ears, a citizen has a right and responsibility to disobey an unjust law. —KA1MPL.

PRAGMATIC IN PR

Recently there have been rumors that licenses have been sold to individuals who were not qualified to have them. Whether or not this is true, it is obvious that there are many new voices on the bands with very little knowledge of amateur radio operating procedures and customs.

In the past, most of us (myself included) have given the cold shoulder treatment to those who show interest in ham radio. Being basically lazy, we seen to forget that when we started there was somebody to help us out (WA2VCG, in my case).

Because new candidates to this hobby aren't able to find the help necessary to learn all they need to know to get a license, they are more easily swayed to take an easier route to get their license. Money.

There is always somebody willing to take a chance to make a buck. The point is that these newly licensed "candidates" are just starting out. They, too, need help to become knowledgeable ham operators. We need to help anyone, licensed or a candidate for a license, who needs help. If we don't start right now we're going to have a great big mess, which may be the end of a very interesting hobby.

Jim Meyers KP4BE
Juana Diaz PR

That's the spirit! —KA1MPL.

CHEAPSKATES

As a ham, I am appalled at the lack of response other U.S. hams have shown toward John WM4T and his call for financial assistance to help recoup the losses from his landmark legal battle with the local authorities concerning PRB-1.

It is downright shameful that a supposedly cohesive group of hobbyists known as amateur radio operators would ignore such a plea. Are so many hams willing to let someone else pay $7,000+ out of his own pocket to defend their rights? If only one ham out of every thirty contributed $1, his expenses would be completely reimbursed. Surely $1 is a small price to pay to ensure one's own rights.

John showed a lot of courage in standing up for his rights—the same rights that entitle you to operate your station. Help him out—he deserves it!

Richard Stuart WO6P
El Cajon CA

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TS-711A/811A VHF/UHF all-mode base stations

The TS-711A 2 meter and the TS-811A 70 centimeter all mode transceivers are the perfect rigs for your VHF and UHF operations. Both rigs feature Kenwood's new Digital Code Squelch (DCS) signaling system. Together, they form the perfect "matching pair" for satellite operation.

- **Highly stable dual digital VFOs.** The 10 Hz step, dual digital VFOs offer excellent stability through the use of a TCXO (Temperature Compensated Crystal Oscillator).
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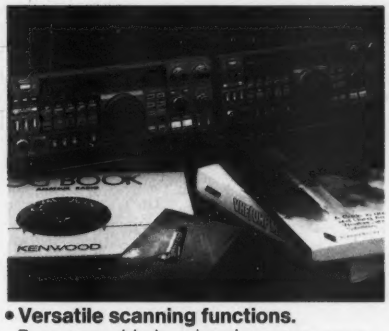
- **40 multi-function memories.** Stores frequency, mode, repeater offset, and CTCSS tone. Memories are backed up with a built-in lithium battery.



- **Versatile scanning functions.** Programmable band and memory scan (with channel lock-out). "Center-stop" tuning on FM. An "alert" function lets you listen for activity on your priority channel while listening on another frequency. **A Kenwood exclusive!**
- **RF power output control.** Continuously adjustable from 2 to 25 watts.
- **Automatic mode selection.** You may select the mode manually using the front panel mode keys. Manual mode selection is verified in International Morse Code.
- **All-mode squelch.**
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- **Speech processor.** For maximum efficiency on SSB and FM.
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- **Built-in AC power supply.** Operation on 12 volts DC is also possible.
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- **VS-1 voice synthesizer (optional)**

More TS-711A/811A information is available from authorized Kenwood dealers.

Optional accessories.

- IF-10A computer interface
- IF-232C level translator
- CD-10 call sign display
- SP-430 external speaker
- VS-1 voice synthesizer
- TU-5 CTCSS tone unit
- MB-430 mobile mount
- MC-60A, MC-80, MC-85 deluxe desk top microphones
- MC-48B 16-key DTMF, MC-43S UP/DOWN mobile hand microphones
- SW-200A/B SWR/power meters: SW-200A 1.8-150 MHz SW-200B 140-450 MHz
- SWT-1 2-m antenna tuner
- SWT-2 70-cm antenna tuner
- PG-2U DC power cable

Complete service manuals are available for all Trio-Kenwood transceivers and most accessories. Specifications and prices are subject to change without notice or obligation.

KENWOOD

KENWOOD U.S.A. CORPORATION
Communications & Test Equipment Group
2201E. Dominguez St., Long Beach, CA 90810

NEW PRODUCTS

Santec's docking booster for their ST-20T/ST-200ET HTs.

DOCKING BOOSTER

Naval Electronics makes a Docking Booster for the Santec ST-20T/ST-200ET hand-held transceivers. The Docking Booster turns the ST-20T into a powerful mobile unit with 30- or 50-Watt output. Receiver sensitivity is also boosted through a low-noise GaAsFET preamplifier (16 dB). The booster is designed to attach quickly to most car doors and it provides connections to the car battery and the outside antenna. It also comes with mike hangup clip.

For further information, circle number 211 on your Reader Service card.

ICOM IC-900

ICOM has introduced a six-band fiber-optic mobile transceiver. The "band units" are remotely controlled via a compact control unit. The compact controller, which measures only 2.9" x 2" x 1", can be placed in any convenient location near the operator; the band units can be placed in some other spot in your vehicle (such as the trunk). The band units are connected to the controller by a fiber optic cable to eliminate rf feedback.

Among the features of the control unit are: 10 memories, two scanning systems (for memory and programmable scan), and crossband operation. Band units are available for 2 meters (25/45W), 10 and 6 meters, 220 and 440 MHz, and 1.2 GHz.

For more information on the IC-900 or other ICOM products, see your local ICOM dealer.

MINI "BEAR" CAT SCANNER

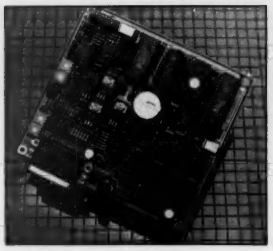
Engineering Consulting has just released The mini "Bear" Cat scanner for the FT-727R and the Commodore 64 computer. This interface allows for the programming of the Yaesu FT-727R at 4800 baud. The entire contents of the radio can be loaded in under 15 seconds. All parameters are stored and and up to ten sets of channels (ten each) can be scanned, all at once or individually. Information can be saved to disk, which allows 100 channels/disk. There is scan lock-out for individual channels, and scan speed and resume times are adjustable. All transmit and receive frequencies plus offsets and encode/decode subaudible tones can be input and loaded into the radio on command. Return data from the FT-727R provides a full-screen digital S-meter which may be used to stop the scan on preset signal strengths from S1 to S9. There is a comment field for each channel entered, and it is displayed while scanning. All information for each channel programmed (in groups of ten) is simultaneously displayed on the monitor. Once the channels are entered via the computer keyboard, the information in any of the ten frequency groups may be downloaded to the HT for portable use.

The model 727S is supplied with hardware and software to operate with the Commodore 64/64C/128/SX64 series. The hardware interface includes the circuit board, components, cables, instructions, and connectors. Assembly time is about 10 minutes. The kit is priced at $39.95.

For more information about the mini "Bear" Cat scanner, circle Reader Service number 208.

S-COM "5K" REPEATER CONTROLLER

S-COM Industries has added the "5K" to its line of repeater controllers. The CMOS microprocessor design supports both a repeater and a control receiver and requires only 60 mA at 12 V dc. Applications include control of main-site repeaters, remote receiver links, portable repeaters, and emergency repeaters.



The S-COM "5K" repeater controller.

Operating parameters are remotely programmable via DTMF commands. Data is retained in nonvolatile memory. Three logic inputs and three logic outputs are provided for site control and monitoring purposes.

Features include CW shaping, a watchdog monitor, flexible repeater interfacing, a CW clock and calendar, DTMF muting, security passwords, a "polite" identifier, transient protection, and power MOSFET outputs. Options include full IC socketing, rack-mount cabinet, wall-mount power supply, and audio delay module.

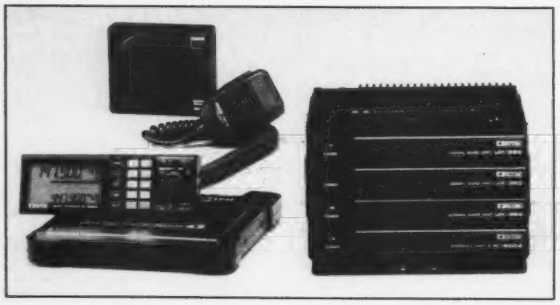
For more information about S-COM repeater controllers, circle number 218 on your Reader Service card.

QFAX-1 WX FAX RECEIVE TERMINAL UNIT

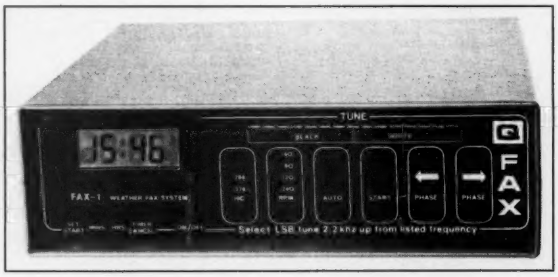
Quay Technologies has announced the QFAX-1 Weather Facsimile Receive Terminal Unit. QFAX-1 is a microprocessor-controlled intelligent interface unit designed to be connected between an SSB receiver with LSB reception and a low-cost computer graphics printer (such as Epson's FX-80 and compatibles). Operation has been made simple for the non-technical person.

The terminal unit itself is powered from 12 V dc at under 0.5 A, availing it to mobile and marine application (it comes with a mounting bracket).

For further information on this



ICOM's IC-900 6-band mobile transceiver.



Quay's weather facsimile receiver terminal unit.

product, please circle number 207 on your Reader Service card.

CSI PAGING ENCODER

Communications Specialists, Inc., now has available a rack-mounted version of the their PE-1000 Paging Encoder. Called the PE-1000RM, this new encoder may be mounted in a standard 19″ rack. Like the desk-top model, the RM is capable of 100- or 1000-call paging capacity in the two-tone sequential signaling formats. Five-tone sequential and REACH formats are also available. All features are included in every unit and are fully field-programmable through the front-panel keyboard. Programmable features include, but are not limited to, code plan and group selection, group call duration of tone and delay timing, choice of alert tones, and automatic page. A nonvolatile memory retains the programming if a power loss occurs. All standard Motorola and General Electric groups are included in every unit; non-standard tones from 250 Hz to 400 Hz may be specially ordered. An output for printing a hard-copy record of all paging activity is provided, and an automatic self-test is run each time the encoder is powered up. The PE-1000RM is available for $324.95.

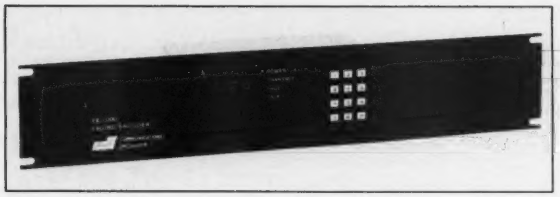
For more information on the PE-1000RM Paging Encoder, please circle number 209 on your Reader Service card.

HL-37V COMPACT AMPLIFIER

Tokyo Hy-Power Labs introduces the HL-37V, a compact amplifier designed for 144-MHz FM/SSB hand-held and portable transceiver operation. The unit has a built-in variable-gain RX preamp which uses a low-noise GaAsFET. The HL-37V will allow you to enjoy comfortable DX QSOs by expanding the communication range limit of hand-held radios.

The front panel has a smoked polycarbonate sub-panel so that the LED lights can be recognized only when they are lit. Combined with an HT, the HL-37V will boost power to 30 W output from 2–3 W input (rf driving input of 0.5–5 W is accepted). It has a low spurious signal emission with an effective output low-pass filter. The built-in RX GaAsFET preamp allows a noisy and weak signal to be received more clearly. Gain is continuously variable from −20 dB to +40 dB. There is an LED power-level indicator on the front panel. The FM/SSB mode select switch is on the rear panel. The changeover from RX to TX has a delay of about 1 second on SSB so that the relay does not chatter.

Suggested list price is $99.95. Further information may be obtained by circling number 210 on your Reader Service card.



The rack-mounted paging encoder from Communications Specialists, Inc.

HF-LINK HARDWARE AND SOFTWARE

Wald-Easterday Associates, Inc., released its HF-Link line of hardware/software products which allow the amateur radio operator to control the Yaesu FT-980 and the FT-757GX HF transceivers. These new products are designed to interface with the Atari 8-bit family of microcomputers so that the user can control these two transceivers with a standard joystick, and eliminates the need of manually typing operating commands on the computer. These products also provide the user with an on-screen graphic depiction of the transceiver's operational status and include such features as: scan for memory channels at user-determined rates, rapid production and updating of station logs, unlimited storage of log and memory channel data on disk, and the use of the fire button to key the transceiver's transmitter.

To find out more about this product, circle number 213 on your Reader Service card.

ANTENNA ELEVATOR SYSTEM

Glen Martin Engineering is introducing the Hazer model H-3 for use with the Rohn 20 and 25G towers. The Hazer is an elevator system that will raise and lower an entire antenna system up and down the tower safely and conveniently. The H-4 Hazer is heavy-duty, with a wind-load rating of up to 16 sq. ft. It comes complete with all hardware, a winch, cable, and necessary brackets. Price including UPS delivery is $278. GME also supplies rotors and thrust bearings. For a complete catalog or more information, please circle Reader Service card number 219.

MIRACLE FLUX

Specially designed for soldering dissimilar metals and aluminum. This flux provides good electrical connection when soldering NiCd batteries or aluminum to copper. For mechanical strength, combine miracle flux with fluxless miracle rod.

For more information on this flux, circle Reader Service card number 215.

SUPER NiCd's FOR ICOM HTs

Periphex has released NiCd battery packs for ICOM HTs. The Super NiCd BP-7S is rated at, 13.2 V, 900 mA—double the capacity of the ICOM BP-7 for IC-02/03/04AT 5-W output. The Super BP-8S is rated at 9.6 V, 1200 mA—50% more capacity than the ICOM BP-8 for IC-2/3/4AT and IC-02/03/04AT. Both are base-charge only, with the BP-7S using the BC-35 and the BP-8S using either the BC-30 or BC-35. The price for either unit is $60 + $3 shipping.

For further information on these units, please circle number 212 on your Reader Service card.

BUTANE ENERGIZED SOLDERING IRON

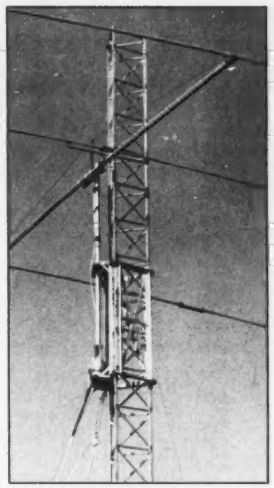
Eaglestone's butane-energized Portasol cordless soldering iron eliminates the need for battery recharging. It measures 7″ long x 1/2″ diameter, heats in seconds, and offers adjustable heat output equivalent to 10–60 Watts. Its 3-oz. body allows easy tip control and eliminates fatigue.

Portasol's protective cap contains a built-in igniter which, with a flick of the thumb, energizes the catalytic tip. This tip glows orange-red, does not flame, and is operational in less than thirty seconds. Non-electric, Portasol is static-free.

Filled by a butane cartridge, Portasol gives an average of 60 minutes of cordless soldering. It arrives ready-to-use, equipped with a 2.4mm tip; 1.2mm, 3.2mm, and 4.8mm tip sizes are available.

Portasol is priced at $30 plus $2 for shipping and handling. Additional tips cost $8.50 each.

For more information, please circle number 214 on your Reader Service card.



The Hazer elevator system lowering a 40-meter beam.

Periphex Super NiCd's for ICOM HTs.

CABLE AND CONNECTOR GUIDE

Nemal Electronics International has released its Cable and Connector Selection Guide. This 36-page guide includes more than 100 new cable and connector products covering a wide array of rf coaxial, microwave, broadcast, communications, and data applications. Extensive cross-references and illustrations allow the user to easily select the appropriate cable, connector, and tooling for any application.

To find out more about the cable catalog, please circle Reader Service number 217.

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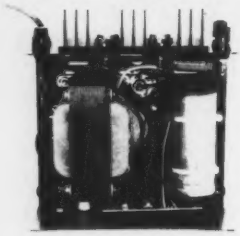

INSIDE VIEW — RS-12A

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MODEL RS-50A

MODEL RS-50M

MODEL VS-50M

RM SERIES

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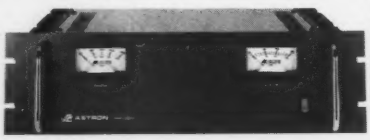


MODEL RM-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RM-12A	9	12	5¼ × 19 × 8¼	16
RM-35A	25	35	5¼ × 19 × 12½	38
RM-50A	37	50	5¼ × 19 × 12½	50
• Separate Volt and Amp Meters				
RM-12M	9	12	5¼ × 19 × 8¼	16
RM-35M	25	35	5¼ × 19 × 12½	38
RM-50M	37	50	5¼ × 19 × 12½	50

RS-A SERIES

MODEL RS-7A

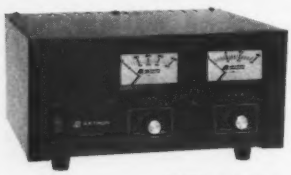
MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-3A	2.5	3	3 × 4¾ × 5¾	4
RS-4A	3	4	3¾ × 6½ × 9	5
RS-5A	4	5	3½ × 6⅛ × 7¼	7
RS-7A	5	7	3¾ × 6½ × 9	9
RS-7B	5	7	4 × 7½ × 10¾	10
RS-10A	7.5	10	4 × 7½ × 10¾	11
RS-12A	9	12	4½ × 8 × 9	13
RS-12B	9	12	4 × 7½ × 10¾	13
RS-20A	16	20	5 × 9 × 10½	18
RS-35A	25	35	5 × 11 × 11	27
RS-50A	37	50	6 × 13¾ × 11	46

RS-M SERIES

MODEL RS-35M

MODEL	Continuous Duty (Amps)	ICS* (Amps)	Size (IN) H × W × D	Shipping Wt. (lbs.)
• Switchable volt and Amp meter				
RS-12M	9	12	4½ × 8 × 9	13
• Separate volt and Amp meters				
RS-20M	16	20	5 × 9 × 10½	18
RS-35M	25	35	5 × 11 × 11	27
RS-50M	37	50	6 × 13¾ × 11	46

VS-M AND VRM-M SERIES



MODEL VS-35M

• Separate Volt and Amp Meters • Output Voltage adjustable from 2-15 volts • Current limit adjustable from 1.5 amps to Full Load

MODEL	Continuous Duty (Amps) @13.8VDC	@10VDC	@5VDC	ICS* (Amps) @13.8V	Size (IN) H × W × D	Shipping Wt. (lbs.)
VS-12M	9	5	2	12	4½ × 8 × 9	13
VS-20M	16	9	4	20	5 × 9 × 10½	20
VS-35M	25	15	7	35	5 × 11 × 11	29
VS-50M	37	22	10	50	6 × 13¾ × 11	46
• Variable rack mount power supplies						
VRM-35M	25	15	7	35	5¼ × 19 × 12½	38
VRM-50M	37	22	10	50	5¼ × 19 × 12½	50

RS-S SERIES

MODEL RS-12S

• Built in speaker

MODEL	Continuous Duty (Amps)	ICS* Amps	Size (IN) H × W × D	Shipping Wt. (lbs.)
RS-7S	5	7	4 × 7½ × 10¾	10
RS-10S	7.5	10	4 × 7½ × 10¾	12
RS-12S	9	12	4½ × 8 × 9	13
RS-20S	16	20	5 × 9 × 10½	18

*ICS—Intermittent Communication Service (50% Duty Cycle 5min. on 5 min. off)

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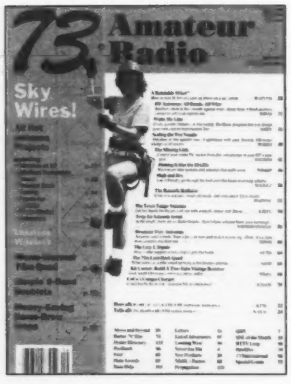

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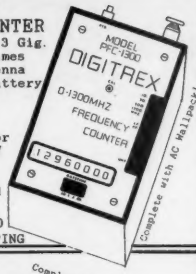

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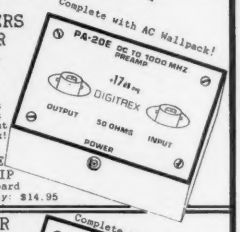

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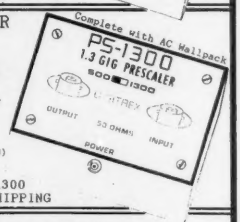

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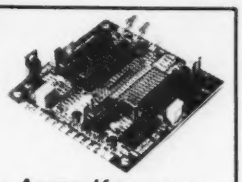

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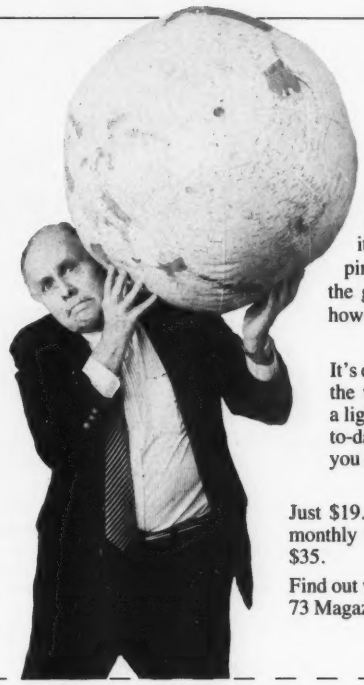

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73 Review

Yaesu FT-290R II 144-MHz Mobile/Portable Transceiver

Yaesu USA
17210 Edwards Road
Cerritos CA 90701
Price Class $580

Tonna F9FT 9-Element 144-MHz Portable Yagi

Tonna Antennas imported by:
The PX Shack
52 Stonewyck Drive
Belle Meade NJ 08502
Price Class: $60

by Peter H. Putman KT2B

Photo A. The Yaesu FT-290R II configured for mobile operation with the FL-2025 amplifier.

Photo B. The FT-290R II configured for portable operation with a rubber duck and an FBA-8 battery pack.

This review is dedicated to all of those jaded two-meter operators who've reached the end of their ropes and think the thrill is gone on 144.200 MHz. Surprise! I've come to tell you that the thrill is back (and then some)!

The Yaesu FT-290R II multimode transceiver offers base/mobile operation with 25 Watts and portable operation with 2.5 Watts. The Tonna 9-element 144-MHz portable yagi requires no tools to assemble and breaks down in minutes for easy transportation. Together, they make a very compact and efficient station, ideal for mountaintopping, portable/emergency operation, or just lying in a hammock and making a few SSB contacts while sipping a cold drink. Here is a package that weighs in at less than 10 pounds and offers full two-meter communications flexibility . . . portable packet, FM, CW and SSB DX, and of course repeater operation.

The FT-290R II

We'll start with the FT-290R II, but first a little historical background is in order. Many readers no doubt recall the earlier FT-290/690/790 series radios. These nifty units ran about 3 Watts output on FM/CW/SSB, with 10 memories and a self-contained battery pack. They made their appearance in the U.S. market in the early 1980s but didn't seem to sell all that well here (based on conversations I've had with Yaesu dealers). I'm not sure why, because they offered a very nice combination of power to weight as well as long battery life.

At the same time the radios sold like hotcakes in Europe! In fact, I saw an ad last year in the RSGB magazine which claimed that ". . . the FT-290 is the most popular 2-meter radio of all time." There must have been a reason for it, and that reason became obvious shortly: Grid Squares. Yep, stations in Europe were buying 290s and 790s (for 70 cm) and going grid square hopping. 290s were also finding favor as low-power mobile stations; many accessory amplifiers were bought for this purpose.

"The Tonna is designed to be assembled with the most common tool on the face of the earth: fingers."

Times have certainly changed on this side of the Atlantic—grid squares have become the rage, and so it would seem that the U.S. market is wide-open for small portable VHF transceivers. Yaesu must have been thinking the same thing, and it didn't take long for the ads for the 290R/690R to catch my eye. Being one of those incorrigible backpacking VHF types, I knew I had to get one to review soon. (And Yaesu was more than happy to oblige me, sending along one of each and a few battery packs as well!)

There are several different ways that the 290R II is shipped, but I assume my sample was representative: It came with the core radio/control head, heat sink/power amplifier module, dc power cord, and mobile bracket. I also received a rubber duckie antenna with the basic package—it wasn't immediately useful and I'll touch on that momentarily. With this setup, you're ready for 25 Watts of SSB/CW/FM operation from your car or base station. The heat sink/power amplifier combination snaps on with two latches to the back of the control head assembly (see Photo C), and the dc leads are attached to a suitable power source.

An RCA plug delivers low-level rf of about 2.5 Watts to the final amplifier. Three gold-plated contacts deliver control voltages and sample the ALC level, and a screw post depresses a spring-loaded switch to keep the front-panel light on while in use. The contact mechanism appears to be very solid and reliable, and the two spring latches on either side

Photo C. View of the modular connections between the control unit and the power amp (shown) or battery pack.

ensure a positive locking fit. You just make your antenna connection (standard S0-239), apply 13.8 V dc at about 5 Amps, and away you go!

Back to that duckie. The FT-290R II is easily configured for portable operation by removing the heatsink assembly and snapping on the accessory battery pack (FBA-8) which will hold 9 NiCd or alkaline cells, depending on your preference. You then install the duckie antenna or other antenna of your choice to the front-panel BNC connector. But you don't get the battery pack with the radio! It is an optional accessory. So why include the rubber duckie? (Unless you want to take a motorcycle battery and operate a real heavy-duty QRP station. Of course, once you've purchased the FBA-8, things work very well with the rubber duck. Things work even better with a quarter-wave antenna, and best of all with a beam. But I'm getting ahead of myself.)

The control layout of the FT-290R II definitely falls into the "simple" category, as Yaesu went light on bells and whistles. Basically, you have controls for volume, squelch, clarifier (RIT), and a big tuning knob. There are also several dual-function push-buttons to select the two vfo's, any of the ten memories, the desired mode, repeater offsets or simplex operation, high or low power, priority channel, and scanning operation. With these controls, you can program independent mode, offset, and frequency information into any channel.

The front panel has definitely been "human engineered," as the largest controls are the ones you use most often–volume, squelch, and tuning/memory select. The display is a soft green, but the bulb intensity leaves a bit to be desired in mobile operation. Incidentally, the bulb switch is not engaged when the battery pack is snapped on, so as to prolong battery life. If you need to engage the switch momentarily, or even lock it on, you can do so with a recessed twist-switch on the battery pack. Good thinking, Yaesu.

Now, with the battery pack in place, you have a radio weighing about 4 pounds which sizes up at roughly 6" wide X 7 3/4" deep X 2 1/4". Small enough for you? Incidentally, the sizes are the same with the power amplifier assembly. Speaking of the power amplifier, here's a neat twist: You can attach four screws through the back of the mobile bracket and attach it to the heat sink/amplifier permanently. Then, just release the two side latches and snap on the battery pack when you arrive at your portable location. When finished, remove the battery pack and slide the control head back into the mobile bracket and reattach the latches. Piece of cake!

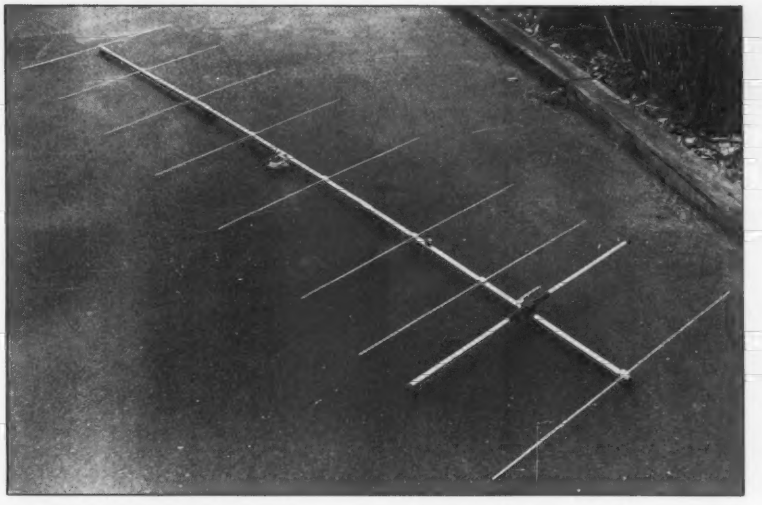

Photo D. The Tonna 9-element portable 2m antenna fully assembled. Note the T match and the square-boom construction.

FT-290R II PERFORMANCE MEASUREMENTS

Specification	Claimed	Measured
Minimum Discernible Signal	n/a	−130 dB
Sensitivity		
10 dB S/N	.2 uV SSB/CW	.25 uV SSB/CW
12 dB Sinad	.25 uV FM	.25 uV FM
Squelch Law		
SSB/CW	n/a	.2 uV
FM	n/a	.2 uV
Selectivity, −6/−60 dB		
FM	12/25 kHz	15/25 kHz
SSB/CW	2.4/5.2 kHz	2.5/6 kHz
Sensitivity "S9"	n/a	5 uV, SSB/CW/FM
Power Output (W)		
w/FL-2025 amp	Hi 25/Lo 5	Hi 25/Lo 5
w/FBA-8 & NiCds	Hi 2.5/Lo n/a	Hi 2.8/Lo .4
Current Drain (A)		
w/FL-2025	Hi 8 max.	Hi 6
	Lo n/a	Lo 3
w/FBA-8	Hi 1.1	n/a
Receiver Current Drain (mA)	80	120

Let's take a look at the front-panel controls again. There are ten of them–nine main controls and a yellow shift button. The VFO key toggles between vfo's A and B, while with the shift control this key initiates a programmed memory scan between band limits defined in memories 1 and 2—exclusive of mode. The key marked MR enables the ten-position memory selection. Shifted, it actuates a selected memory channel as a priority channel while in the vfo mode. A key is provided for large frequency stepping up or down using the shift key. Repeater offsets of −600 or +600 kHz are provided, or you can split the vfo's for an odd offset with the RPT swtich. The STEP key determines tuning speed (typically 25, 100, or 2500 Hz in SSB/CW; 5, 10, or 20 kHz in FM). Shifted, it chooses low or high power, low being typically about one-tenth of high.

Finally, a REVERSE key is provided for listening on repeater inputs. This key also actuates the optional FTS-7 Tone Generator Unit. The MODE key is self-explanatory; when shifted, it turns the noise blanker on and off. The last key is the MEMORY IMPUT key, used both when programming and when setting the "skip-scan" feature up (wherein selected memories can be locked out of scan mode).

So—now that I had this nifty transceiver all loaded up with fresh batteries, I needed three things: (1) A contest. No problem there as I opted to try out the FT-290R II during the ARRL 144 MHz Spring Sprint on April 13. (2) A good location. Again, no problem. I settled on the Catfish Fire Tower near Catfish Pond in the Kittatiny Mountains of western New Jersey, about 1500 feet ASL. (3) A portable antenna. This looked to be a problem as I was growing weary of tearing my 4-element KLM yagi apart and reassembling it over and over again! (So was the antenna!) However, help came from a nearby source, as Ivars Lauzums

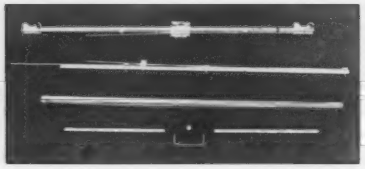

Photo E. The Tonna breaks down into a neat package—the only tools needed for assembly are your fingers.

Photo G. The portable station setup at 1500 feet—the moon is rising in the east.

KC2PX of the PX Shack offered the use of one of his Tonna 9-element portable yagis, model #20089.

The Tonna

This unassuming antenna is designed to be assembled with the most common tool on the face of the earth: fingers. Clever selection of boom stock and element material has resulted in a high-gain lightweight yagi for virtually any use on 2 meters. The elements have two notches on them–one at the end and one in the middle. The latter serves to center the element before you secure it to the boom. The former keeps it from falling out of its retaining clip when you collapse the yagi for portable operation.

Tonna employs the same feed system as is used on their 13- and 17-element yagis with a T-match sealed in plastic. A type N connector is standard and a decoupling sleeve is provided which also secures the coaxial cable feed. Assembly time is extremely short—20 minutes if you work methodically, 10 if you don't. Broken down it takes up very little space, with three sections and the driven element all fitting inside a canvas tent stake bag about 3 feet long. The disassembled antenna is shown in Photo E. Incidentally, the three boom sections are coded with both green tape and an inked-on arrow to indicate the correct mounting direction when reassembling.

Tonna claims an isotropic gain of 13.2 dB for this antenna, with the front-to-back ratio specified at 19.8 dB. This latter figure is about what I expected for a 9-element yagi. (The assembled boom length is 11.5 feet.) The −3-dB beamwidth is also fairly broad at about 40 degrees. The F/B ratio is tolerable for contest mountaintopping (considering the weight and ease of assembly). Remember that strong local signals running high power can be your biggest problem when you're mountaintopping—this is especially a problem here on the East Coast. (I could have sharpened the front pattern up a bit by stacking two of these, but would have the extra weight and masting to contend with—not worth it.

Photo F. All loaded up and ready to climb—the radio is inside the backpack.

Photo H. Close-up of the operating position.

The boom material is the same as used on the 9-element conventional Tonna yagi, but the clamps are different for the elements. I couldn't see a real problem with using the antenna permanently; the brackets appeared to be plenty strong enough.

As mentioned earlier, you only need fingers to assemble the yagi, but keep a 10mm wrench handy to attach the beam to the mast of your choice. The supplied brackets will accommodate up to 2″ mast material. I opted for the lightest, cheapest TV masting around—20-gauge 5-foot sections from Radio Shack. (Remember, the point here is to save weight whenever possible!) Using my time-tested low-profile anchor and lightweight 1/8″ nylon rope, I was able to come up with a very portable mast arrangement weighing under 10 pounds.

Up, Up, and Away

And off I went with the FT-290R II, a keyer, logbook, fluorescent lantern, canteen, and two 5' pieces of TV masting. A few odds and ends in the pack rounded out the list, including my camera, some snacks, and extra warm clothes for the mountaintop. I decided to get a warm meal before tackling the climb, which straddles the Appalachian Trail. The mediocre weather conditions earlier in the day showed signs of improvement as I headed west, and the sun broke through as I arrived at the trailhead at 7 p.m.

It took about 15 minutes to load up the equipment and backpack, and the hike to the top was accomplished in 20 minutes. I killed another 20 minutes or so setting up the antenna, baseplate, and guy ropes. The entire installation appears in Photo G, with the moon rising to the east. Photo H shows the guts of the station—FT-290R, MFJ keyer, lightweight phones, clock, camp light, and a ground pad to park my rear end on.

At 8 p.m. KT2B/2 QRP burst onto the airwaves with an astounding 2.5 Watts, being careful to stay away from 144.200 MHz so as to improve the chances of making contacts through all that QRM. By 8:30 p.m. I had worked 15 stations in 4 grid squares–not a bad rate for QRP! The temperature was dropping rapidly as the cloud cover moved away, making for spectacular and chilly views of the moon rising. I put on a few more layers of clothes and dug in, working 32 contacts and 6 more new grids during the next hour. Reports were spectacular! Everyone liked the audio quality (many refused to believe I was running anything less than 100 Watts) and signing "...portable QRP" brought more than a fair share of quick replies.

I finished my last hour of participation with a flourish, bagging 19 more QSOs and 3 additional grids, including a 400+ mile QSO with VE3ASO in FN15 (central Ontario) on SSB! (That ought to convince skeptics of the potential of QRP on VHF.) I should add that conditions were average. No enhancement was observed from my mountaintop QTH. I wound up making all of my QSOs on SSB, as I had to wear gloves due to the cold and couldn't operate the built-in microswitches on my keyer accurately. Despite all of this, I finished with 66 QSOs and 13 grid squares.

It was a simple matter to break everything down; the antenna came completely apart in about 10 minutes. I stuffed everything into the backpack and slid the antenna sections into slots on my pack used for cross-country skis. On the way down the path, I did have a problem with elements sliding out and hitting my legs or the ground, hence the suggestion to secure the elements with rubber bands. When I arrived at the car I detached the battery pack inserted the control head back into the bracket, locking up with the power amplifier module. Presto! Back on 2-meter FM mobile for the trip home (and an occasional SSB contact here and there).

Now, that is truly a painless operation. You could travel lighter than I did, but I've gotten used to 30–40-pound packs with extra support gear in them when I hit the hills. This setup would lend itself well to the summer contest schedule, especially during the ARRL June and September VHF QSO Parties (where a separate QRP entry exists) and the *CQ* Worldwide VHF WPX in July (also in the QRP or Portable classes). The trick here is to use a good gain antenna with your QRP signal, and the Tonna fits the bill perfectly. (By the way, for those of you who are REALLY ambitious, Tonna also makes a 13-element version of this antenna, they claim 14 dB gain and 27 dB F/B ratio on a 14-foot boom.) You should also use the lowest-loss coaxial cable possible. RG-8/X works surprisingly well in short runs, and represents a good balance between weight and signal attenuation. Remember, the total feedline run from the 9-element yagi on a 10-foot

mast is less than 20 feet. RG-8 works somewhat better if you don't mind the added bulk and weight.

In the Lab

Finally, the bench test results. I was very impressed with the front end on the FT-290R during actual operation, especially during pileups near and on 144.200 MHz. (Yes, I actually ventured onto the calling frequency, which is like riding the interstate on a bicycle during rush hour!) The usual measurements were taken, excepting dynamic range and compression point. It would appear that the latter figure is in excess of at least 0 dB, based on observations in the field.

The hysteresis in the squelch circuit is a bit spongy, and it takes almost as much signal to open it in SSB/CW mode as it does to produce 10 dB S/N ratio. A similar situation existed in FM, and in fact many times the squelch will not open when no signal is present, even if the control is set to absolute minimum sensitivity (e.g., no squelch) while in the FM mode. On the other hand, it doesn't take much signal to open it at that point, so it isn't a problem.

I wish the lamp was a bit brighter on the display, especially when mobiling at night. Compared to the FT-290R, my Alinco ALR206 display looks like a neon sign on Broadway! I suspect this is a result of trying to save current drain on the batteries when the lamp is used. The 1-Watt audio output stage may be strained a bit if you operate in a noisy environment, but in discussions with Yaesu this again is a function of current consumption and speaker size. I just keep the volume control up to 80% of maximum setting while mobiling and that works fine.

Conclusion

No doubt about it, Yaesu has a winner here. I haven't had this much fun on VHF in years. The combination of a mobile radio and portable shoulder-slung radio all in one package makes it hard to beat, and the receiver performance is better than average for the design. The choice of C cells for the battery pack will result in longer operating time (I took two packs for the 144 MHz Sprint and barely exhausted one of them in 2-1/2 hours) and that means you can have more fun sitting on mountaintops at night in cold weather trying to work rare grids like I did! Seriously, the battery life is probably on the order of 4–6 hours per pack, assuming about a 25% duty cycle (SSB/CW).

The Tonna 9-element 144-MHz portable yagi makes the perfect companion for the FT-290R, owing to its extremely light weight, strong boom construction, and simplicity of assembly. Its front-to-back ratio and gain figures are more than adequate for the simple QRP station, and the sealed, pretuned driven element is sufficiently broadbanded to cover all of the 144-MHz band with better than 1.5:1 vswr.

For more information about the FT-290R II, circle number 203 on your Reader Service card; for more information about the Tonna 9-element yagi, circle number 204 on your Reader Service card. ■

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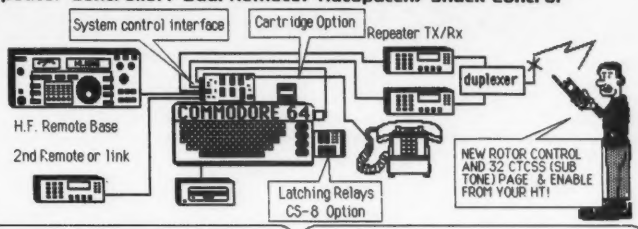

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The SuperSCAF From AFtronics

AFtronics, Inc.
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by Jim Thompson W4THU

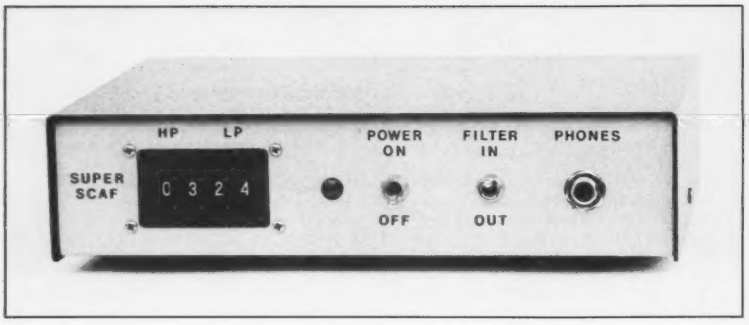


Photo A. The SuperSCAF from AFtronics.

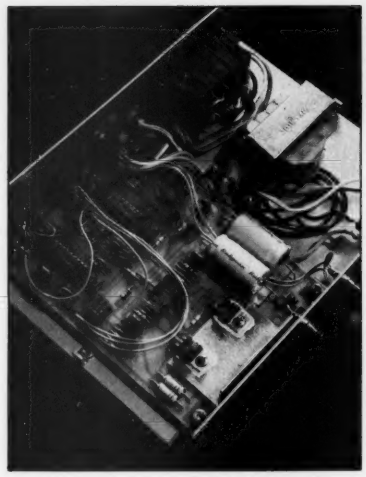


Photo B. Inside the SuperSCAF.

Present-day receivers offer a diverse arsenal of weapons for fighting QRM. Synthesized, multiple-conversion receivers feature distributed selectivity (multiple filters at different i-f frequencies), excellent gain distribution, low noise, high dynamic range, unwavering stability, variable bandwidths, passband tuning, slope tuning, variable bfo's, i-f notch filters, noise blankers, instant QSY, and QSK. All of this sophistication might lead you to expect little help from external accessories. The central question of this review is: "Can an outboard audio filter help a modern quality HF transceiver?"

Advances in Audio Filter Technology

Audio filters or processors have come a long way. The day of the simple LC circuit is gone. Filters using banks of operational amplifiers and closely matched components may be breathing their last breath. Gone, too, are many of the problems that reduce the usefulness of most conventional audio or baseband filters. The "ringing" and monotone monotony, long trademarks of narrowband audio filters, are being eliminated. Digital techniques are now being used in audio filtering and processing.

The SuperSCAF, available from AFtronics, Inc., is one such digital audio processor. A SCAF is a "Switched-Capacitor Audio Filter. The SuperSCAF contains none of the components usually found in audio filters. There are no coils, op amps, or precision-matched components. The SuperSCAF has an over 150 dB/octave rolloff. It also has a 50-Hz-wide filter to effectively cope with a busy CW band or pileup. If you want to find out more about how these filters work, refer to the article in the April, 1986, issue of *QST*. The article was written by Rich Arndt and Joe Fikes, who head up AFtronics, Inc.

Building The SuperSCAF

It would be unfair for me to say that this kit is for everyone. You need to be comfortable using a low-wattage soldering iron and working with solid-state components. If you are new to kit building, I would suggest practicing on a scrap printed circuit board. Anyone who is willing to take the time to follow the instruction manual carefully should have no trouble completing the kit.

You will have to make your own cable to connect your receiver to the SuperSCAF. The input connector is a phono jack. The audio output from the SuperSCAF is available from both the front and rear panel. A built-in audio amplifier has more than enough power to drive any headphones or speaker.

One feature that is missing is the ability to accommodate headphones with stereo phone plugs. This includes stereo headsets and Heil headphones, among others. You can overcome this problem with a mono-to-stereo adapter. You could also replace the SuperSCAF's single-circuit jack with a two-circuit "stereo" jack. The latter would be my choice. Plastic bags hold most of the kit's parts. If you cannot identify all of the parts, take the time to become really familiar with each component before you begin construction. Several pages of the manual are devoted to parts identification and proper soldering techniques. This is a two- or three-evening project. The instruction manual is a real hand-holder and will carefully guide you through the PC board maze.

Switch-Selected Filter Response

The SuperSCAF provides separate low-pass (LP) and high-pass (HP) filters. Each is independently adjustable, and together they produce a bandpass response. The cutoff frequencies of each filter are switch-selectable in 100-Hz increments from the front panel. For example, dial up "03" on the HP thumbwheel switch. The filter passes only frequencies above 300 Hz. Select "05" on the HP thumbwheel and only frequencies above 500 Hz will pass through unattenuated. Select "30" on the LP thumbwheel and only frequencies lower than 3000 Hz get through the filter. Since the LP filter was left set at 500 Hz, the SuperSCAF is now functioning as a bandpass filter with a nearly flat response from 500 to 3000 Hz. Above and below these selected frequencies, signals disappear quickly. If you prefer less high-frequency response, simply dial some lower number on the LP thumbwheel switch. If you dial "20", for example, the filter response will be 500 to 2000 Hz.

A Super CW Filter?

An inherent calibration error exists in the SuperSCAF's HP filter. The HP cutoff frequency is actually about 10% below the frequency indicated on the thumbwheel. I suggest taking advantage of this error to create a narrow bandpass filter. For example, if you dial in "04" into the HP thumbwheel, and "04" into the LP thumbwheel, the 10% error results in a filter that is only 40 Hz wide, centered on 380 Hz. Dialing in "07" into the HP and LP thumbwheels will give you a 70-Hz filter bandwidth centered near 675 Hz. However you set the thumbwheels, just remember to take into account the calibration error in the HP filter if you want to accurately figure your bandpass. The skirt selectivity is better than the CW crystal filter that is in your rig.

Critical Listening

Two transceivers, representative of a wide range of transceivers, were used to test the SuperSCAF. The primary transceiver was a Kenwood TS-930S. The first thing that I noticed is that the SuperSCAF, when in the "filter out" mode, was not as quiet as the audio system in the TS-930S itself. Switching the SuperSCAF to "filter in" eliminates the problem. Unfortunately, the SuperSCAF's own audio amplifier is always in the circuit. My preference is to completely bypass the SuperSCAF's circuits when the filter switch is in the "out" position.

The results were excellent. Reducing the LP cutoff frequency can really cut out interference from nearby stations. The effect is similar to using the slope tuning controls on the TS-930S, but with somewhat better rolloff characteristics.

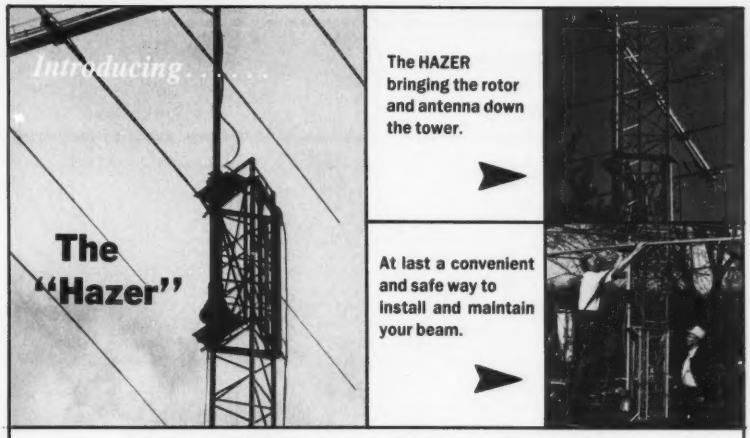
To fully appreciate the SuperSCAF, you must use it on CW, where you take fuller advantage of the narrowband characteristics. A filter with a 40-Hz bandwidth can be a real help when the QRM gets serious. With the SuperSCAF, it's a case of "now you hear him, now you don't." It's surprising how much space exists between CW stations. To use this order of selectivity, your receiver must be absolutely stable and should have a slow tuning rate. Another curious characteristic is the improved signal-to-noise ratio that the narrow bandwidth provides. It seems easier to dig signals out of the mud.

The results with the TS-820S were similar to those from the the TS-930S, except for its own constant background hiss. Using the SuperSCAF with a moderate bandwidth ("0330" dialed in on the thumbwheels) improved this nicely. Many of the filtering features now standard on newer transceivers were not available on the TS-820S.

The project was easy to put together, and everything about it is first-class. The only problems I found were the "filter in/filter out" switching scheme with its resultant background noise and the mono-only jack.

The filter's skirt selectivity is excellent and the thumbwheel adjustment of frequencies is very convenient. There is a worthwhile CW selectivity improvement, and improvement on SSB, as well. The SuperSCAF is an effective new weapon in the battle against QRM.

For more information, circle Reader Service number 239. ■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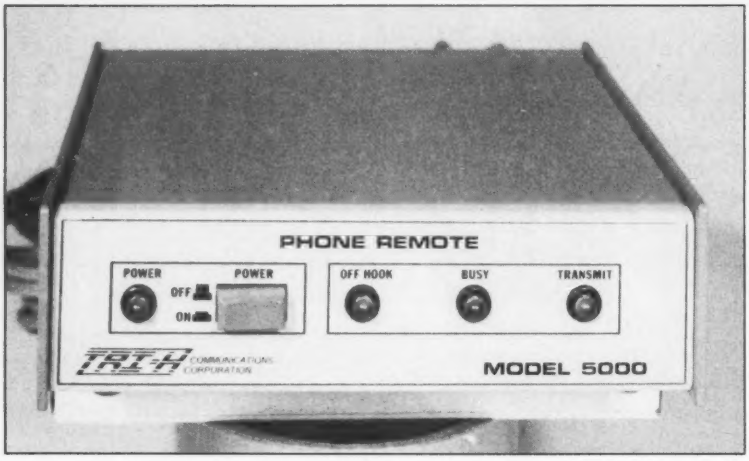

The Phone Remote 5000 is a small device that allows you to connect any HF, VHF, or UHF radio to a touchtone™ telephone. The Phone Remote is not a phone patch and it doesn't allow your mobile station to originate a phone call. It allows you to operate your base radio on a preset frequency via the telephone when you're away from home. The Phone Remote doesn't allow you to control any transceiver function other than transmit and receive. Activity and push-to-talk timers are provided in case the phone connection is lost.

The Phone Remote 5000A is a small unit, about 5-3/4" x 6-1/2" x 1-3/4". The front panel contains a power switch with indicator LED and three status LEDs marked OFF HOOK, BUSY, and TRANSMIT. There are four cables coming from the rear of the unit. The phone line is terminated in a standard modular jack and can be plugged into any phone plug or "T" adapter. The power line is a 2-conductor cable which is connected to 12 V dc and ground. When the external speaker line is connected to an external speaker, the Phone Remote will route the audio to the speaker when the Phone Remote is not in use, and mute the speaker when the remote is in use. The last cable is a four-conductor mike cable. A suitable mike cable connector for your radio must be wired for ground, PTT, and mike audio.

"The Phone Remote allows you to operate your base radio on a preset frequency via the telephone when you're away from home."

Programming

The first thing to be programmed is the ON/OFF code. When the code is pressed on the telephone touch pad, the Phone Remote unit will be turned on and off. The ON code is * followed by two digits; the OFF code is # followed by the same two digits. A truth table is provided to make the setting of the 8-position DIP switch very easy. This code prevents unauthorized use of your radio.

A ring counter is programmed so that the the Phone Remote unit will pick up on 1, 2, 6, or 10 rings. If the Phone Remote is on its own line, you may want to leave the unit at its factory programming of 1 ring. If the Phone Remote shares your home line, a 6- or 10-ring setting will let you beat the unit to the call.

The PTT timer determines how long any one transmission can be. If the phone connection is lost, the time set will be the maximum time before the unit drops out. The timer can be set for one, two, three, or four minutes.

The activity timer tells the Phone Remote how long to remain connected to the phone line in the event that there is no activity on the touchtone pad. The unit will beep 30 seconds before it disconnects. The available times are 3, 5, 10, and 15 minutes.

Operation

The operation of the Phone Remote couldn't be simpler. If your transceiver is turned on, tuned, and ready to operate, all you have to do is dial the number that the phone remote is connected to. When the unit answers, you'll hear a *beep*. When you enter your ON code you'll hear the receiver audio. To transmit, key the * button. To receive, key the # button. Use the * and # buttons to switch between transmit and receive during the QSO. When you're done, enter your OFF code and hang up. That's all there is to it.

Conclusion

The unit that I tested functioned perfectly. Because I have two phone lines in my shack, I was able to hook the unit to one line and call it from the other. This arrangement allowed me to be present at the radio while I evaluated the unit. The unit is designed to be operated without a control operator physically present at the station, so care should be taken in deciding how the unit should be used. The Phone Remote should provide years of service.

For more information, circle number 205 on your Reader Service card.■

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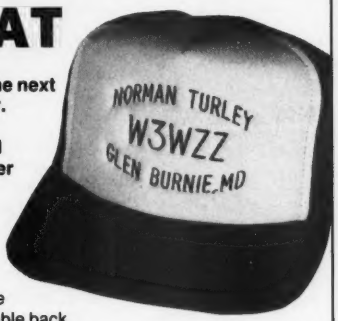

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by Bernard C. Herring Z21EI

The QSYer from Stone Mountain Engineering.

The Yaesu FT-757GX transceiver was introduced toward the end of 1983 and provided a number of attractive features in a small size. Highlights were a 100-Watt output on all HF amateur bands, provision for computer interfacing, dual vfo's, and scanning and memory systems. In addition, several items, normally options, were included in the package.

Taking into account the reasonable price, it was not surprising that the FT-757GX attracted good reviews in the amateur press. But one criticism came up every time—the tuning rate is too slow. Typical comments were: "The tuning rate can be a bit of a pain," "A QSY of 250 kHz [is] somewhat laborious," and "Frequency changes [are] a tedious business."

Well, I have been a Yaesu fan since the first FT-101, and who needed to QSY that fast, anyway? So I bought one, and a while later sat back, looked at the tuning knob, and thought, "What this rig needs is a keypad."

To banish any charges of bias, I had acquired a Sony ICF-2001 general-coverage receiver a year or so before buying the 757. This Sony product relied entirely on keypad frequency entry, allied with UP, DOWN, and FAST buttons. It wasn't long before I sat back and thought, "What this receiver needs is a tuning knob."

I don't know the lead time between concept and production of a radio, but both Sony and Yaesu have recently produced later models employing both tuning knob *and* keypad. Maybe telepathy works!

FT-757GX owners don't have to look at new models to solve the keypad problem. A smart little device—the QSYer from Stone Mountain Engineering—will give them instant QSY facilities from 500 kHz through 30 MHz.

The tuning knob retains its use for band-searching, but if you want a spot frequency fast, the QSYer will find it for you in less time than keying up a phone number. In fact, the QSYer employs a standard telephone keyboard of 10 alphanumeric keys plus two control keys designated by a star (*) and a pound sign (#). The number keys enter numbers, the star is used as a decimal point, and the pound key transfers the numerical value of the frequency to the 757 digital readout. That's the *slow* way of entering frequency.

The QSYer thinks for itself, and between 3 and 30 MHz it will place the decimal point correctly without using the decimal key. Leading and trailing zeros don't have to be entered either, so 14.2 MHz is entered as 142#, and the 757's digital display will show 14.200.0. The tuning knob can be used to shift away from any frequency entered by the QSYer. Frequencies below 3 MHz *do* require use of the decimal key: 1.8500.0 would be entered as 1*85#.

Physically, the QSYer is housed in an aluminum box only 3-1/2" deep, 3" wide, and 2" high, finished in baked enamel that matches the 757 color scheme. The top of the enclosure, on which is mounted the light gray plastic keypad, slopes at 10° just like a normal telephone keyboard.

A 42" cable connects the QSYer to the rear panel of the FT-757GX. The cable terminates in two plugs: One connects to the data input port on the 757 (marked REMOTE) and the other to the +8-V-dc or the +13.5-V-dc jack. If connection between the 757 and the QSYer takes longer than 30 seconds, you're spending too much time drooling over the joys to come! But, exercise care with the plug connection to the remote jack—the pins in the jack are easily bent! Once connected, the QSYer is ready for immediate use, and you'll wonder how you ever got along without it.

There are some useful bonuses with the QSYer. Frequency changing for the blind op is a snap; the long connecting cable allows the keypad to be placed where it suits your operating convenience.

Second, keypads that are built into transceivers are vertically mounted and the keys have to be "poked." The QSYer keys are "pressed," so you can avoid marking up the keys with your fingernails.

And, for the musically minded, each of the number keys on the QSYer "bleeps" when it is pressed. These bleeps are on a rising scale from 1 to 0. The scale is near enough to the tonic sol-fa to play simple tunes—or even to compose!

Any gripes about the QSYer? I don't think so. The price is right, and the installation guide is a model of clarity. Maybe a schematic of the circuitry could have been included, but there's not much more than a single microprocessor anyway. That's the QSYer. Try it—you'll like it.

For more information about the QSYer, circle number 201 on your Reader Service card. ■

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by Adam W. Weiss WA1WMZ/2

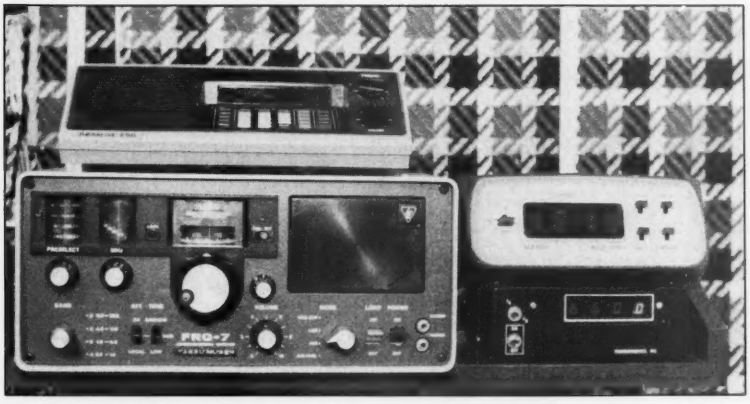

Photo A. The "listening area" at WA1WMZ/2. The Torrestronics digital display is the box at the lower right.

Owners of rigs with analog dials, when asked about the efficiency of digital readouts, usually respond with: "Anyone who can't read an analog dial doesn't have the mental agility of a well-used handball" and "They're safer; they won't go dead on you" and "Everybody knows that it'll cost you a fourtune to update" and "They've got no soul at all" (I have to admit some feeling towards that one). Digital displays are, in fact, easier—especially after a long day. Face it. It's a lot more efficient to be told, in effect, where you are rather than having to ask yourself, "OK, where am I?"

Along with enjoying ham radio, I'm an avid shortwave listener and own, in my opinion, one of the finest "most for your money" receivers made—the Yaesu FRG-7. I've made several modifications to it over the years and truly love it. It is definitely one of Yaesu's better efforts to combine quality and pricing. The only thing that has bugged me over the years is that it is now one of the few pieces of radio gear that I use on a constant basis that isn't digitized. Making it was the perfect final touch.

There are many widgets out there that can do the job, but the Universal Digital Frequency Readout by Torrestronics, Inc. (a family company run by Al Torres KP4AQI), is one of the nicest examples of such. It is sold in both kit form and fully wired; it will allow you to digitally read the receive/transmit frequencies to the nearest 100 Hz. The frequency range (rf input) is from 100 kHz to 50 MHz and the unit has a display format of four 7-segment LED readouts 0.3" high, with the 100-kHz, 10-kHz, and 1-kHz digits in red and the 100-Hz digit in either green or yellow.

The enclosure is what looks to be a Ten-Tec type. It comes with interfacing instructions for more than *twenty* different types of equipment. Chances are that whatever rig you own, it's listed. One really nice feature is a very complete assembly/operating manual (a pleasure to read after seeing some of the faded, poorly written ones that seem to abound these days).

I decided to give my FRG-7 its "new look" one Saturday afternoon while Bob WA2KHR, who shares my fascination with gadgets, was visiting. Bob is helpful to have around, especially if you can get him into a "Hey, that's kinda interesting. . . lemmie see it for a sec" sort of sounding board mode, and then hand him the soldering iron. Anyway, while I was watching a really crummy movie on cable, preparing Dim-Sum, and generally shooting the breeze, the whole digitizing of my FRG-7 took place.

I found only two discrepancies in the interfacing instructions, and these were not difficult to detect and fix: the assembly manual was perfect and explained away most everything. The two errors were:

1. There is no jumper between M and N (step G). You should set the up/down switch in back to down.

2. Step H specifies a DIP switch setting of 545.0, but the 0 DIP setting must be 455.0 (1000 – 545) as per the instructions in the assembly manual (page 17).

All in all, I found that this was a fine piece of merchandise with a very attractive price tag. It works as advertised and I'm glad I finally gave in to the urge to "digitize."

For more information about this product, circle number 202 on your Reader Service card.■

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TS-711A All Mode Base 25w	899.95	Call $
TR-751A All Mode Mobile 25w	599.95	Call $
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TM-2550A FM Mobile 45w	469.95	Call $
TM-2570A FM Mobile 70w	559.95	Call $
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TH31BT 220 HT	269.95	Call $
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FT2700RH 2M/70CM 25w	599.95	Call $

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CIRCLE 272 ON READER SERVICE CARD

Sailing With Ham Radio

Paradise Cay Publications
1001 Bridgeway, #405
Sausalito CA 94965
Price: $9.95 ppd.

by Chris Schmidt KA1MPL

The yachtsman is faced with many choices when determining what kind of communications equipment to install in his sailboat. *Sailing With Ham Radio*, by Ian Keith WA6DNV and Derek Van Loan WB6VXS, presents an overview of the nautical ham radio option and, in the process, provides an excellent basic description of what ham radio is.

> ***"The word 'marine' on any piece of equipment means that its cost is double that of the non-'marine' equivalent."***

SWHR starts by explaining the advantages and disadvantages of ham radio as compared to marine SSB. The main advantage of ham radio is cost (the word "marine" on any piece of equipment means that its cost is double that of the non-"marine" equivalent). Phone patches are cheaper, equipment is cheaper, and you gain a better understanding of your boat's electrical system. On the other hand, marine SSB has no license examination, no restrictions on third-party traffic, and allows commercial communication.

Obviously, the premise of the book is that ham radio is a good option for nautical communcation, and the second section tells you how to go about getting a license—where to get study materials, code tapes, etc. The authors recommend that you go for a General-class license.

Following the licensing information are *very* basic descriptions of electricity and magnetism, as well as how radio works in general. The information here is not at all complete—but it is not an attempt to teach theory for the license test; rather it is to help the reader understand the rest of the book. The illustrations are simple and clear—no intimidating large schematics.

The nuts and bolts of a nautical ham radio station are covered thoroughly. Information about antenna designs, finding a good ground, corrosion, installation, weather FAX, and lightning protection covers the questions that the average sailor would pose. The authors take great pains to explain all ham terms because the terminology is one aspect of ham radio that does scare people away.

Dad Knows Best

My father is a sailor who knows nothing about ham radio. I gave him this book to read

and he loved it. He said that it answers questions he's been wondering about for years. For a sailor interested in learning about ham radio, *Sailing With Ham Radio* is the perfect introduction.

For more information, circle Reader Service number 206.■

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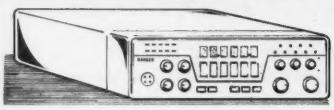
10 METERS!

Multi-Mode Ranger AR-3300



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- Five selectable memory channels
- Favorite channel scanning from memory
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- Easy-to-read LED frequency display
- Available in power outputs of 30 and 100 watts
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RECEIVER
Frequency Range: 28.0000-29.9999 MHz
Circuit Type:
Superheterodyne, dual conversion
Clarifier Range: ±500 Hz
Sensitivity: SSB & CW better than 0.3 μV for 10 dB S+N N. FM better than 0.5 μV for 12dB SINAD
Selectivity: -6dB -60dB
SSB, CW 4.2 KHz 8.6 KHz
AM, FM 6.0 KHz 18 KHz

TRANSMITTER
Frequency Range: 28.0000-29.9999 MHz
Tuning Steps:
100 Hz, 1 KHz, 10 KHz, 100 KHz, 1 MHz
Emission Types:
LSB, USB, CW, AM, FM
Power Output: 30 watt Model
SSB—25 watts, AM FM—8 watts,
CW—30 watts
Input 12.5 VDC 4A Max
Power Output: 100 watt Model
SSB—100 watts+, AM FM—30 watts,
CW—125 watts
Input 12.5 VDC 20A Max

WARRANTY
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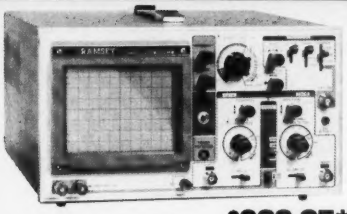

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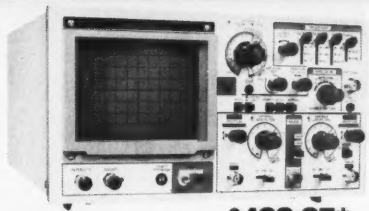
Features component testing circuit for resistors, capacitors, digital circuits and diodes—TV sync filter—high sensitivity—Z axis—XY mode—built-in calibrator—5X horizontal magnifier



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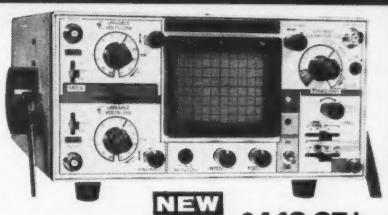

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Field/bench applications—built-in charger and battery pack —up to 2 hours operation per charge—5X horizontal magnification—high brightness CRT—front panel trace rotator

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All Ramsey oscilloscopes feature unsurpassed quality at an unbeatable price. Of heavy duty construction, they are suitable for hobby, service and production applications.

***Add an additional $10.00 for each unit for shipping.**

MODEL	BAND WIDTH	# TRACES	CRT SIZE	VERTICAL SENSITIVITY	MAXIMUM TRIG FREQ	USEABLE MAXIMUM BANDWIDTH
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2500	15 MHz	(2)	3.5 inch	2 mV per div	30 MHz	25 MHz
3500	35 MHz	(2)	8x10CM	1 mV per div	50 MHz	60 MHz

All include high quality 1:1, 10:1 hook on probes, instruction/service manual with schematic and component layout. 1 year warranty.

MINI-100 COUNTER

$119.95 CHARGER, NICAD BATTERIES, AC ADAPTER INCLUDED

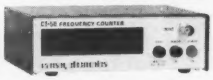
CT-70 7 DIGIT 525 MHz

$139.95 WIRED, INCLUDES AC ADAPTER

CT-90 9 DIGIT 600 MHz

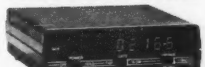
$169.95 WIRED INCLUDES AC ADAPTER

CT-50 8 DIGIT 600 MHz



$189.95 WIRED INCLUDES AC ADAPTER

CT-125 9 DIGIT 1.2 GHz



$189.95 WIRED INCLUDES AC ADAPTER

MODEL	FREQ RANGE	SENSITIVITY	ACCURACY	DIGITS	RESOLUTION	PRICE
MINI-100	1-500 MHz	Less than 250mv	1 PPM	7	100 Hz, 1 KHz	119.95
CT-70	20 Hz-550 MHz	< 50mv To 150 MHz	1 PPM	7	1Hz, 10Hz, 100Hz	139.95
CT-90	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	169.95
CT-50	5 Hz-600 MHz	LESS THAN 25 mv	1 PPM	8	1Hz, 10Hz	189.95
CT-125	10 Hz-1.25 GHz	< 25mv @ 50 MHz < 15mv @ 500 MHz < 100 mv @ 800 MHz	1 PPM	9	0.1Hz, 1Hz, 10Hz	189.95
CT-90 WITH OV-1 OPTION	10 Hz-600 MHz	< 10mv To 150 MHz < 150mv To 600 MHz	0.1 PPM	9	0.1Hz, 1Hz, 10Hz	229.90

RAMSEY FREQUENCY COUNTERS

Ramsey Electronics has been manufacturing electronic test gear for over 10 years and is recognized for lab quality products at breakthrough prices. Our frequency counters have features and capabilities of counters costing twice as much.

RAMSEY D-4100 COMPACT DIGITAL MULTITESTER

$24.95

test leads and battery included

NEW

Compact sized reliability and accuracy. This LCD digital multitester easily fits in your pocket, you can take it anywhere. It features full overload protection • 3½ digit LCD readout • recessed input jacks • safety probes • diode check function • 2000 hours battery life

RAMSEY D-5100 HANDHELD DIGITAL AUTORANGING METER

$49.95

Includes Probes 1 Year Warranty

Provides distinctive audible chirp after contact has been made and meter reading has stabilized. Has TOUCH-HOLD feature to allow readings to be logged or referred to before making the next reading. Up to 10 AMP current capability and a continuity function which beeps on zero Ohms.

$44.95 wired includes AC adapter

PR-2 Kit $39.95

PR-2 COUNTER PREAMP

The PR-2 is ideal for measuring weak signals from 10 to 1,000 MHz • flat 25 db gain • BNC connectors • great for sniffing RF • ideal receiver/TV preamp

$69.95 wired

PS-2 kit $49.95

PS-2 AUDIO MULTIPLIER

The PS-2 is handy for high resolution audio resolution measurements, multiplies Up in frequency • great for PL tone measurements • multiples by 10 or 100 • 0.01 Hz resolution & built-in signal preamp/conditioner

$89.95 wired includes AC adapter

PS-10B 1 GHz PRESCALER

Extends the range of your present counter to 1 GHz • 2 stage preamp • divide by 1000 circuitry • super sensitive (50 mV typical) • BNC connectors • 1 GHz in, 1 MHz out • drives any counter

MINI KITS—EASY TO ASSEMBLE—FUN TO USE—FOR BEGINNERS, STUDENTS AND PROS

TONE DECODER

A complete tone decoder on a single PC board. Features: 400-5000 Hz adjustable range via 20 turn pot, voltage regulation, 567 IC. Useful for touch-tone burst detection, FSK, etc. Can also be used as a stable tone encoder. Runs on 5 to 12 volts.

Complete kit, TD-1 **$5.95**

40 WATT 2 mtr PWR AMP

Simple Class C power amp features 8 times power gain 1 W in for 8 out, 2 W in for 15 out, 5 W in for 40 W out. Max output of 50 W, incredible value, complete with all parts, less case and T-R relay.

PA-1, 40 W pwr amp kit **$22.95**

TR-1, RF sensed T-R relay kit **6.95**

COLOR ORGAN

See music come alive! 3 different lights flicker with music. One light each for, high, mid-range and lows. Each individually adjustable and drives up to 300 W. runs on 110VAC.

ML-1 Kit. **$8.95**

VOICE ACTIVATED SWITCH

Voice activated switch kit provides switched output with current capability up to 100 mA. Can drive relays, lights, LED or even a tape recorder motor. Runs on 9 VDC.

VS-1 KIT **$6.95**

VIDEO MODULATOR

Converts any TV to video monitor. Super stable, tunable over ch 4-6. Runs on 5-15V accepts std. video signal. Best unit on the market! Complete kit, VD-1 **$7.95**

LED BLINKY KIT

Alternately flashes 2 jumbo LEDs. Use for name badges, buttons, warning panel lights. Runs on 3 to 15 volts.

BL-1 Kit. **$2.95**

UNIVERSAL TIMER

Provides the basic parts and PC board required to provide a source of precision timing and pulse generation. Uses 555 timer IC and includes a range of parts for most timing needs.

UT-5 Kit **$5.95**

MAD BLASTER

Produces LOUD ear shattering and attention getting siren like sound. Can supply up to 15 watts of obnoxious audio. Runs on 6-15 VDC

MB-1 Kit **$4.95**

WHISPER LIGHT

An interesting kit, small mike picks up sounds and converts them to light. The louder the sound, the brighter the light. Includes mike, controls up to 300 W, runs on 110 VAC.

WL-1 Kit **$6.95**

FM WIRELESS MIKE

Transmits up to 300' to any FM broadcast radio, uses any type of mike. Runs on 3 to 9V. Type FM-2 has added sensitive mike preamp stage.

FM-1 Kit **$3.95**

FM-2 Kit **$4.95**

SIREN

Produces upward and downward wail. 5 W peak audio output, runs on 3-15 volts, uses 3-45 ohm speaker.

Complete kit, SM-3 **$2.95**

SUPER SLEUTH

A super sensitive amplifier which will pick up a pin drop at 15 feet! Great for monitoring baby's room or as general purpose amplifier. Full 2W rms output, runs on 6 to 15 volts, uses 8-45 ohm speaker.

BN-9 Kit **$5.95**

60 Hz TIME BASE

Runs on 5-15 VDC. Low current (25ma) 1 min/month accuracy

TB-6 Kit **$5.50**

TB-6 Assy **$9.95**

NEW

TELEPHONE TRANSMITTER

Low cost with professional performance. Features include; self phone line powered, tunable from 76 to 100 MHz, polarity antisensitive, compact size (½" x 1¼"), easily installs anywhere on the phone line or inside the instrument itself.

PB-1 KIT **$14.95**

NEW

FM RECEIVER

For built-in applications or hobby experimentation. Full fledged superhetrodyne receiver, microvolt sensitivity, 10.7 MHz IF. Integrated Circuit detector, 50 mw audio amplifier, 9V external power source, operation on standard FM broadcast band as well as large portions on each side, compact (6" square), for bug detection or reception

FR-1 KIT **$14.95**

FM MINI MIKE

A super high performance FM wireless mike kit! Transmits a stable signal up to 300 yards with exceptional audio quality by means of its built in electret mike. Kit includes case, mike, on-off switch, antenna, battery and super instructions. This is the finest unit available.

FM-3 Kit **$14.95**

FM-3 Wired and Tested **19.95**

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RAMSEY ELECTRONICS, INC.
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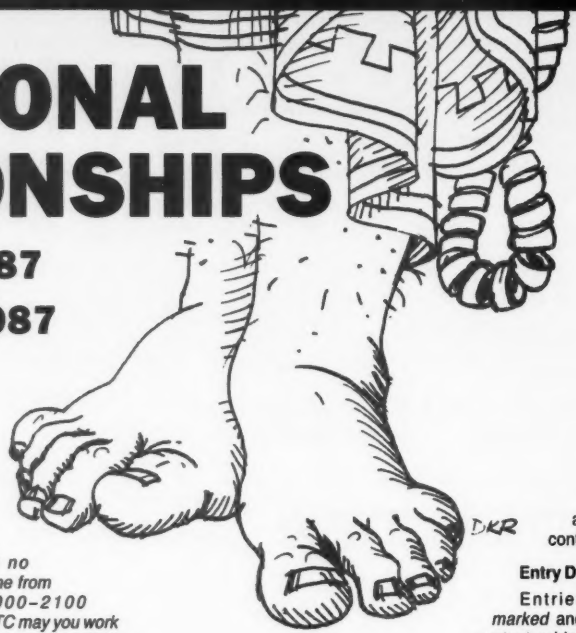
CIRCLE 34 ON READER SERVICE CARD

THE NATIONAL CHAMPIONSHIPS

CW: September 5, 1987

SSB: September 6, 1987



For the first time ever, the "Little Gun" has a chance to become a National Champion! The National Championships have been designed to recognize the Contest Operator of the Year. Unlike other events, they single out the best Contest Operator in the USA, not just the station with the biggest hardware investment!

There will be a *National Sideband Champion* and a *National CW Champion*. The combination of these two contest scores will determine the *Contest Operator of the Year*.

Contestants, analyze your band plan. *Do not* take these events for granted. They are, without doubt, the most complex stress-testing events on the bands today. If you understand the rules, you'll recognize "traps" strewn in your path. Being lax could spell your doom. Should you work all bands? How do you maintain your QSO rate without sacrificing your multiplier average? Should you be using the monobander? What happens when you switch to 10 or 160 meters for the 10-point QSOs? It's up to you, the *Operator*, to do what's best for you!

EXTERNAL AMPLIFIERS ARE PROHIBITED. Run barefoot (up to 200 Watts maximum exciter output power) or your entry is disqualified.

Contest Dates

The First Annual National CW Championship Contest is at 0000–2400 UTC on September 5, 1987.

The First Annual National SSB Championship Contest is at 0000–2400 UTC on September 6, 1987.

Eligibility

Open to *single-operator stations* within the *50 U.S. States only*. A station must be capable of operating two or more bands; there are no single-band categories. Eligible bands include 10, 15, 20, 40, 75/80, and 160 meters.

Miscellaneous Rules

Stations may operate only *18 hours* of each 24-hour contest. The same station may be worked *once on each band*. For stations submitting a contest entry, *external amplifiers are strictly prohibited*. Exciter output must not exceed 200 Watts.

Mandatory Band Switching

This rule separates the men from the boys. Read it over several times, as it is the toughest rule to interpret. Be sure you understand it! Violators must be disqualified and their entries processed as check logs.

Stations submitting an entry must operate only on a single band during the following time frames: 0000–0300 UTC, 0300–0600 UTC, 0600–0900 UTC, 0900–1200 UTC, 1200–1500 UTC, 1500–1800 UTC, and 1800–2100 UTC. In other words, you must establish a band within a time frame and *cannot* move from that band until the next frame.

At no time from 0000–2100 UTC may you work the same band during two consecutive time frames. At least one time frame must pass before the same band can be worked again. *From 2100–2400 UTC only* may stations switch to any band as often as they like.

Exchange

All stations must transmit RS(T) and U.S. State.

QSO Points

10 QSO points per valid QSO on 10 or 160 meters. 5 QSO points per valid QSO on 15, 20, 40, or 75/80 meters.

Multiplier Points

1 multiplier point for each state worked on 15, 20, 40, or 75/80 meters. 2 multiplier points for each state worked on 10 or 160 meters.

Multiplier Average

Multiplier average is determined by totalling all multiplier points and dividing them by the number of bands operated.

Antenna Multiplier

3 Antenna Multipliers for each band worked with a wire antenna design or vertical antenna. Antennas must be fed with a single feedline and not be in a phased configuration. Quads are not considered wire antennas!

2 Antenna Multipliers for each band worked with a duo-, tri-, or quad-band antenna fed with a single feedline and not in a phased configuration.

1 Antenna Multiplier for each band worked with an antenna not specified in the previous two categories.

Note that more than one antenna may be used on a band but *only one antenna may be used at a time*.

Final Score

QSO Points x Multiplier Average x Antenna Multiplier = Final Score.

Contest Entry

Entries must include a separate log for each band worked, a summary sheet itemizing QSOs per band, QSO points per band, multipliers per band, antenna multipliers per band, and total accumulated score. Entries must describe antenna used on each band and sign a declaration that the contest operator abided by the contest rules.

Entry Deadline

Entries must be *postmarked* and forwarded to the contest address below no later than October 20, 1987.

Rules, Forms, Entries

Forms are available from the contest committee. Send an SASE to: The National Championships, 2665 Busby Road, Oak Harbor WA 98277.

Disqualifications

Contestants not following the band-switching requirements will be disqualified. Stations falsely reporting antennas used or falsely reporting output power will be disqualified. Scores requiring more than a 3% scoring adjustment due to duplicate contacts or scoring errors will be disqualified. Contest committee decisions are final!

Penalties

A penalty of one multiplier point, before averaging, will be assessed for each duplicate contact count on the same band and not discounted by the contestant on his/her entry.

Awards

A minimum of 250 QSOs must be worked to be eligible for awards. Awards will be issued to the operator with the most points in each *Call District* and *U.S. State*. Plaques will be issued to the National SSB Champion and National CW Champion.

The CONTEST OPERATOR OF THE YEAR TROPHY will be awarded to the contester with the highest combined score for the two contests. ■

Send For Your National Championship Entry Forms Today

The National Championships
2665 Busby Road
Oak Harbor, WA 98277

HF Equipment	Regular	SALE
IC-761 HF xcvr/SW rcvr/ps/AT	2499.00	2199
CI-V Computer interface adapter	TBA	
EX-310 Voice synthesizer	46.00	

IC-751A 9-band xcvr/.1-30 MHz rcvr	1649.00	1399
PS-35 Internal power supply	199.00	179.95
FL-32 500 Hz CW filter (1st IF)	66.50	
FL-63 250 Hz CW filter (1st IF)	54.50	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
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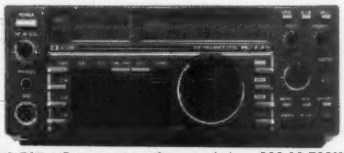
FL-54 270 Hz CW filter (1st IF)	53.00	
FL-52A 500 Hz CW filter (2nd IF)	108.00	99.95
FL-53A 250 Hz CW filter (2nd IF)	108.00	99.95
FL-44A SSB filter (2nd IF)	178.00	159.95



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TS-32 CommSpec encode/decoder	59.95	
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IC-27H Compact 45W 2m FM w/TTP mic	459.00	399.95
IC-37A Compact 25W 220 FM, TTP mic	499.00	439.95
IC-47A Compact 25W 440 FM, TTP mic	549.00	479.95
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The Two-Meter Transverter Project

Build this VMOS transverter and use all of your Kenwood TS-940's bells and whistles—on two meters!

You are the proud owner of Kenwood's amazing TS-940S. After about two months of discovering new buttons every day, you've run across the transverter access jack on the rear panel. Now that you have found it, what do you do with it?

Interfacing a transverter with the 940 not only allows you to expand the 940's frequency range into the VHF or UHF range but also enables you to use all of the 940's modes and functions up there. In addition, you can enjoy direct frequency readout to the nearest 10 Hz.

I operate OSCAR 10 and SSB on 2 meters. Initially, I decided to make up a TS-940 converter interface for use on OSCAR. The unit features a highly stable grounded-gate rf amplifier, a 40-MHz third-overtone crystal oscillator, and a tripler for a 120-MHz output. This would call for a 24-to-28-MHz vfo i-f from the TS-940 for direct frequency readout—24.0 MHz representing 144 MHz, 25.0 representing 145, and 28.0 representing 148, along with fractional readout in between. The OSCAR 10 beacon, for example, reads out 25.810.00 (145.810 MHz).

The excellent operation of the converter/940 comboprompted the development of a full 2-meter transverter, which expands the 940 communication range to include 2-meter SSB, AM, and FM. You will soon find that you can work long-haul DX on 2-meter SSB without repeaters. SSB gets out great where FM does not. If you must use FM, the 940's frequency split and smctf setsmc buttons put you on any pair you want in a flash.

The project breaks down into three segments, but does not include the required 13.0-volt regulated power supply. The first segment is the receiver converter (Figs. 1 and 2); the second is the linear low-level transmitter amplifier stages (Figs. 3 and 4); and the final module is a two-stage, state-of-the-art, and fascinating VMOS 40- or 60-Watt linear amplifier (Figs. 5 and 6).

Basic Material for Boards and Cases

Although both single- and double-sided printed circuit material is used, you will be relieved to know that you will not be required to make etched boards. The basic circuit boards will have circuitry on both sides that are interfaced through #55 holes drilled through the board. The PC material is used for four purposes: double-sided board for the basic circuit, shields, and module case and single-sided material for terminal pads to hook all the components to.

If you have a facility for cutting PC boards, you have an advantage. If not, you can do as I did—scribe, break, and file. It is not as difficult as you might imagine. Take an old 1/2″-wide chisel, grind the sides more or less thin and parallel, and form a sharp hook on the front side. The hook is fashioned to scribe deeply through the foil and into the fiber or glass material.

You will need a cutting board about 1/2″ to 3/4″ thick, two 3″ or 4″ C clamps, and a stout piece of steel to use as a straightedge. Mark off the material and clamp the straightedge to the material to be cut, the waste side exposed to the cutting edge of the chisel. Draw the

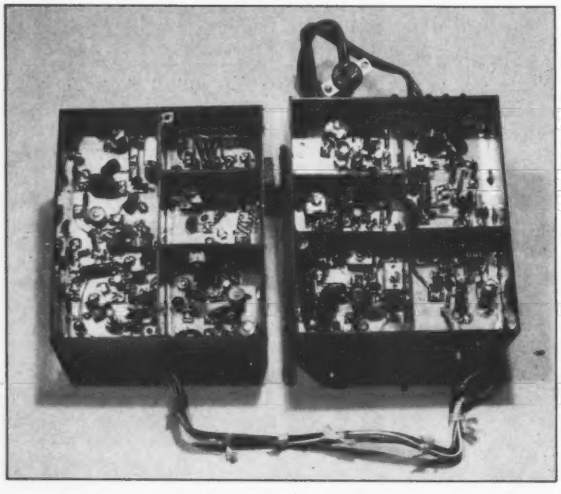

Photo A. Top view of the receiver and transmitter modules.

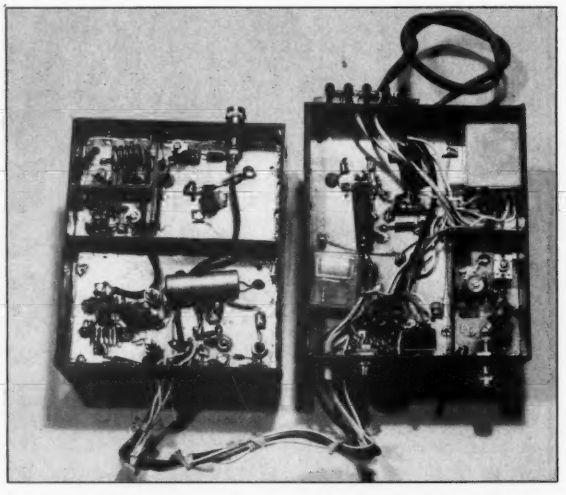

Photo B. Bottom view of the receiver and transmitter modules.

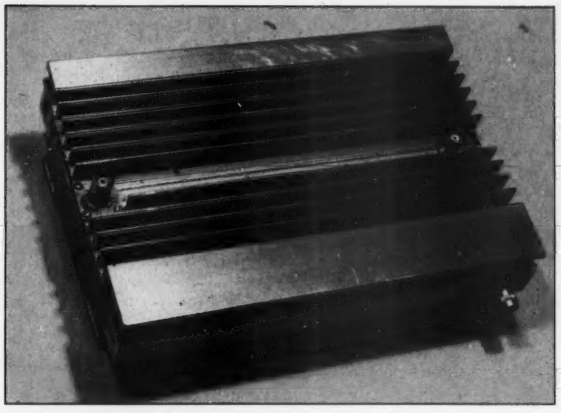

Photo C. Top view of the power amplifier showing the heat sink.

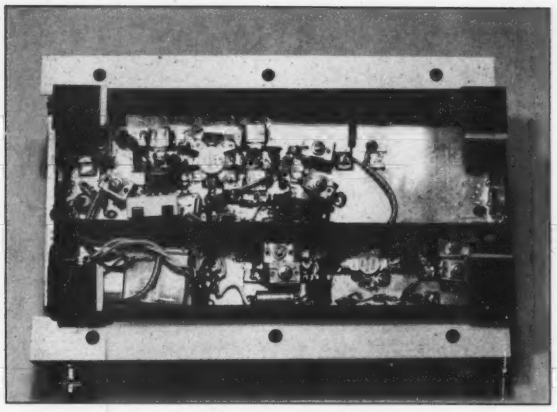

Photo D. Bottom view of the power amplifier.

chisel along the scribe line, scoring away the material. It will take six to eight swipes to get the edge deep enough. For the initial large cuts, it will require scribing the board on both sides.

The material can be snapped off while still clamped, or it can be placed between the jaws of a bench vise. As the pieces become smaller, the breaking of the material is all done in the vise. Like-sized pieces, such as the box sides, are stacked together and filed square in the vise. The material should be checked with a 6″ or 12″ carpenter's square. This operation is time-consuming but surprisingly easy and precise.

The single-sided material is cut into strips 1/8″, 3/16″, 1/4″, and a couple 5/16″ wide. The wide strips are used on the power amplifier. These strips are cut to the desired length with side-cutting pliers (commonly called dikes). These pieces are the soldering terminal pads and are securely set into position on the circuit board with one or two drops of Eastman 910 adhesive (or Krazy Glue®). It takes about four seconds to set up and can be soldered to immediately.

Box Measurements

The receiver converter fits into a module 5″ x 4-1/4″ x 2″ divided into an upper section 1-3/16″ deep and a bottom section 3/4″ deep (Fig. 2). This allows for the 1/16″ section separator board thickness. Cut the

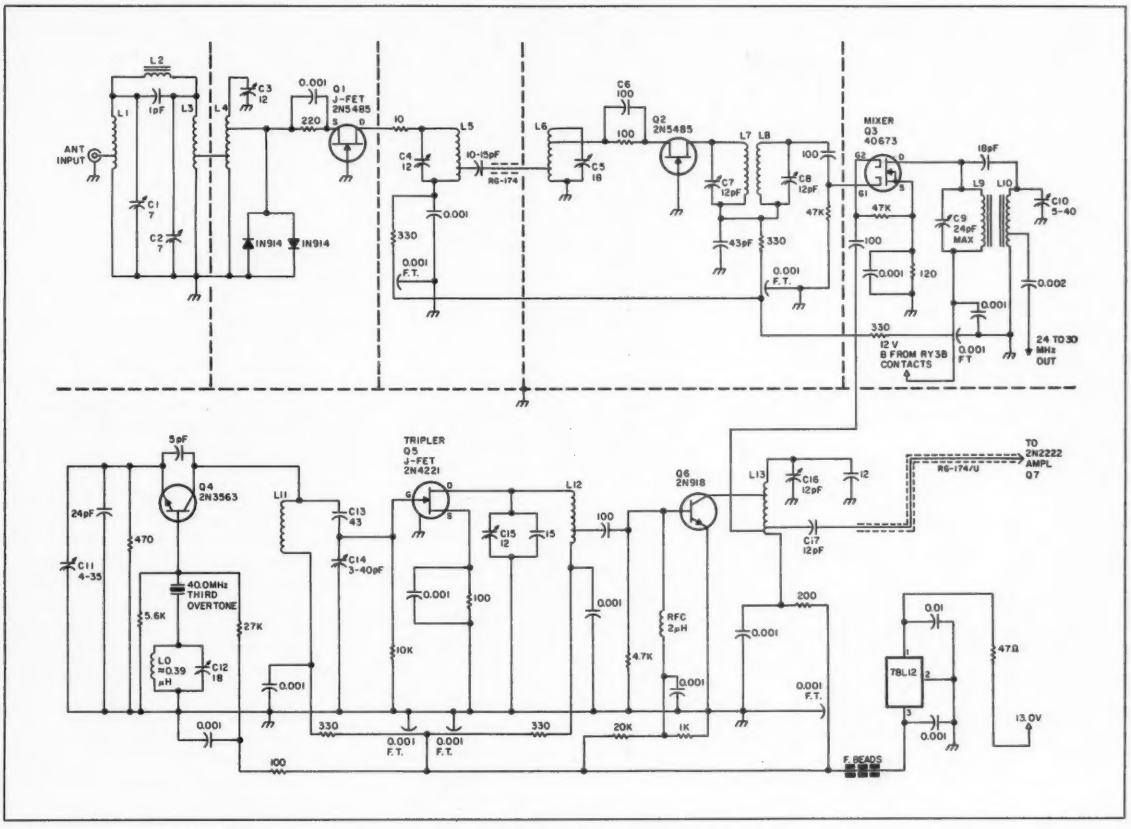

Fig. 1. Two-meter receiver converter.

long side sections to 5-1/8" and the narrower ends to 4-1/4". I used the weight and squareness of a drill press vise to prop the material in position while spot-soldering the boxes together. You will need small pieces of jig material to hold the main board to the proper height position for the initial soldering of the box.

The low-level transmitter module is 5" x 4-3/8" x 2" (Fig. 4). Here again, make the longer side material 1/8" longer than the 5" main board length to compensate for the 1/16" thickness of the two end pieces.

The dimensions of the power amplifier will somewhat depend on the heat-sink material you use. My heat sink was 8" x 5-1/2". The nine cooling fins were only 1/2" deep, but were ridged on both sides. I recommend 3/4" to 1" fins. The PC board mounted within the heat sink and measured 7-3/4" x 3-3/4" (Fig. 6).

The driver and final stages were laid out parallel to one another rather than in the more conventional serial layout. A shield of double-sided material separates the stages. A length of 1/8" 50-Ohm RG-174 coax connects the output of the driver to the input of the final. I suggest a board width of at least 4" rather than the 3-3/4" I used. The final stage could be brought forward by about 1" to avoid crowding at its output.

You can lay out the parts sequentially as construction progresses stage by stage from the schematic. The component layouts mainly show transistors, coils, tuning capacitors, some coupling capacitors, and feedthrough capacitors in their relative placements. From there, it is easy to determine the position of the other components, namely 1/4-Watt carbon resistors and .001 disc ceramic bypass capacitors. Other capacitors are dipped silver micas (dog-bone type). There is no reason to crowd, as there is plenty of room in each compartment for all of the components, even if those you choose are somewhat larger.

Interfacing the System With the TS-940

Since Kenwood does not make a transverter, they provide practically no information about using one, although they do give a very abbreviated drawing of the jack and its pin identifications. For more than this, you must refer to the Kenwood parts layout and schematic diagrams, which is quite a chore. The information in Fig. 7, a wiring diagram that includes the relay circuits, is what you need.

Inserting the special 8-pin DIN plug into the jack immediately inhibits the 940's LF transmit capability. The plug mechanically activates switch contacts that isolate circuitry from the HF antenna connections. (Refer to the service manual schematic on the upper left corner of page 103.)

Here are the pin functions from page 29 of the operator's manual: Pins 1 and 3 are grounding connections for the shields of RG-174 coax. Pin 2 provides the 12 volts @ 50 mA needed to activate an external control relay. Pin 4, when grounded by an external switch, activates an internal (940) relay (#3), which disconnects the 940's vco from its rf amplifier input stage. Pin 5 accepts the transverter's receiver mixer output (24-to-28-MHz) signal. Pin 6 is an ALC signal if you need it for an amplifier. Pin 7 provides a vco i-f signal output of about 100 mW for the transverter's transmit mixer. Pin 8 is the 940's internal high-frequency antenna junction.

Get an 8-pin mike plug and jack—the same as on your mike input to the 940. This will become the input plug for the transverter. It and a triple-pole double-throw switch are installed on the low-level transmitter module where all control takes place.

Make up a 5-wire cable approximately 18" long; attach the DIN plug at one end of the 8-pin mike plug on the other. Three of the conductors will be RG-174 1/8" 50-Ohm coaxial cable (available from Henry Radio). The coax cables connect to pins 5, 7, and 8. Insulated stranded 20-gauge wire conductors connect to pins 2 and 4. To avoid confusion, the same numbering is used on the mike plug end as is used on the DIN plug. The on/off switch provides a ground return for the 940's transverter jack pin 4 as noted above. It also provides 12 volts to the transverter oscillator chain and it connects pins 5 and 8 of the DIN plug together to reestablish low-frequency transmission capability to the 940 when the transverter is turned off.

Now, before I get into the construction part of the transverter, there is a necessary bit of vital information about the 940 of which you should be aware. Ham equipment with full coverage of 2 to 30 MHz has built-in transmit-inhibiting circuitry so that the equipment will not transmit out of the authorized ham bands. You will, however, need transmitting capability from 24 to 28 MHz in order to use the transverter.

In order to have this capability, you will have to cut diode D130, which is located on the unit B PC board located just behind the LCD sub-display and the notch squelch control. (This information was previously published in the Kenwood newsletter of the International Radio

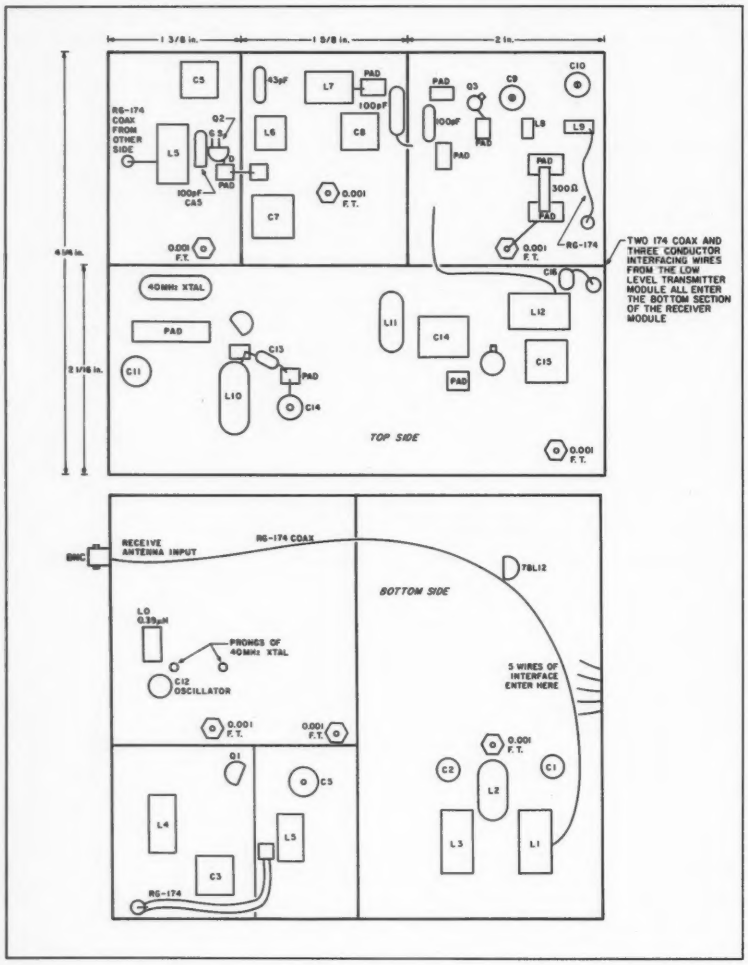

Fig. 2. Relative parts placement diagram for the receiver converter.

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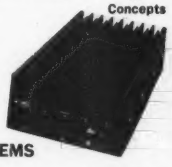

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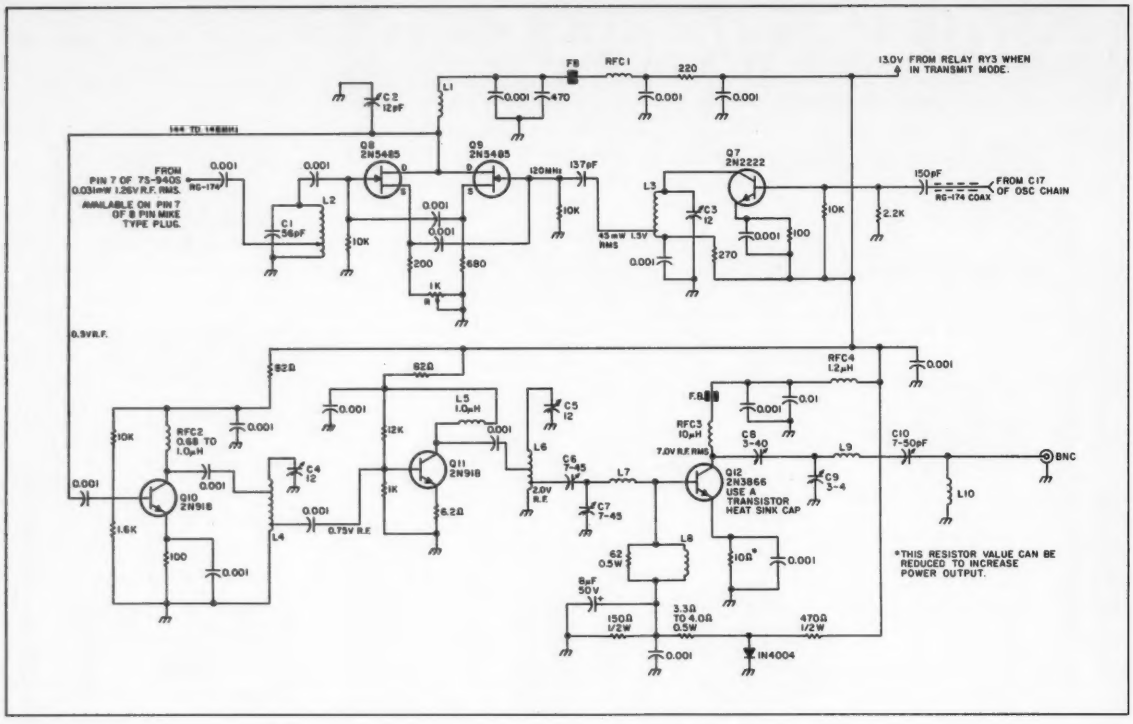
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144 TO 148MHz
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0.3V R.F.
45mW 1.5V RMS
7.0V R.F. RMS
2.0V R.F.
0.75V R.F.
FROM C17 OF OSC CHAIN
RG-174 COAX
Q8 2N5485
Q9 2N5485
Q7 2N2222
Q10 2N918
Q11 2N918
Q12 2N3866 USE A TRANSISTOR HEAT SINK CAP
IN4004
BNC
*THIS RESISTOR VALUE CAN BE REDUCED TO INCREASE POWER OUTPUT.

Fig. 3. Low-level transmitter mixer and 144–148-MHz linear amplifier chain.

Club, issue 54, May, 1985.) Now, let's proceed in earnest to the heart of the technical material.

Receiver Converter Description

The basic circuit concept with much modification and redesign was made around the converter published in the 1985 ARRL *Handbook* (from the chapter on VHF equipment, page 31.5). I had difficulty getting any of a quantity of overtone crystals to operate as described in the oscillator circuit shown. All of the crystals wanted to oscillate on their fundamental, but did put out the third overtone at the drain. Despite that, all of the crystals were military overtone devices. I was unable to isolate the fundamental of 13.33333 MHz while trying to get a single JFET to multiply out to 120 MHz in its output drain. It might work with some crystals, however.

This circuit was redesigned using a bipolar 2N3563; it will work equally well with a 2N918 or 2N2222. One of my converters worked well with an air coil in L11, but I detected some stray signals radiating in a second unit. The condition was resolved by use of a capacitive divider and a toroidal inductor. Attempting to obtain too much from a single stage has its drawbacks, so I added a tripler circuit.

There is always a loss in output when you are frequency multiplying. For a rule of thumb, you can retain about 55% of the input power in doubling and about 35% when tripling. I thought of using a 60-MHz crystal and a doubler, which may have eliminated one of the stages in the chain, but I had second thoughts on the matter.

Before leaving the oscillator stage, I should note that the lowest frequency obtainable from the oscillator with the crystals purchased was 375 Hz high. Adjustment of C1 only increased the frequency further. A small inductance that I designate as L0 was added to the end of the crystal that would normally go to ground. This brought the frequency down by about 500 Hz.

Too much inductance will stop oscillation altogether. I ended up with about .39 uH, .5 uH, or .6 uH maximum. You can make up this inductance by winding #36 wire on a 1/4-Watt resistor of 5,000 Ohms or higher. Start with about 20 turns and remove turns until the frequency is down by about 400 Hz. A small trimmer or air capacitor can tune the inductance. I used a 3-to-22-pF air trimmer, but it only required about 10 pF. I tuned out one-half of the capacity in C11, then set the exact frequency or slightly below with C12, then tuned it right on with C11.

The test point for the counter probe was at the capacitor divider junction (C13 and C14). I used the counter test probe in its X10 position for minimum circuit loading. Another way would be to hold the tip of the probe near L13 and adjust the oscillator to exactly 120 MHz. If the crystal you use falls below 40 MHz with one side of the crystal to ground, you can eliminate L0 and C12 by directly grounding that side of the crystal.

The tripler output is tuned to 120 MHz by virtue of L12 and C15. I used a 2N4221 JFET for the tripler, although a 2N5485 or 5486 and others can be substituted. An additional 120-MHz stage was needed, but did not require a great deal more gain for receiver injection.

Some additional oscillator level is required for the transmitter section. This initially created a moderate problem: The first unit I made up had just enough gain in this stage to provide the proper receiver mixer injection voltage one turn off the hot end of the coil. Everything was fine until I got to the low-impedance point for driving the additional stage for the transmitter where the tap was just off the cold end.

When I switched to transmit, the lower impedance tap on L13 was less of a load on the circuit and required less capacity for resonance. I had to provide a diode-switched capacitor in the circuit to regain resonance for receive. The present revised Q6 circuit now supplies enough gain so that the receiver injection point is just above that for the transmitter and no additional compensating capacitor is required.

Cascaded Front End and Filters

A previous converter had intermod from a local FM station. I had to build a separate outboard filter to take care of this problem. On the input of the revised circuit located on the bottom side of the receiver module is a combination bandpass filter and an 88-MHz commercial FM band filter. This converter also has cascaded JFET pre-selector stages. Each stage has approxi-

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KLM's field proven KT-34A is the heart of the "XA" model. The boom length of the "XA", however, has been doubled, and one tri-resonant and one full size 10 meter element have been added. These changes increase the gain to **11-11.3 dBd** on 10M, **9-9.5 dBd** on 15M, and **8.5-9 dBd** on 20M. Two driven elements are used to make the KT-34XA unusually broadbanded (a concept applied to many KLM antennas). Gain is virtually flat across each band except for 10 meters which has been optimized for the DX'er, 28-29 MHz. The chart shows the remarkable performance qualities of the KT-34XA.

The KT-34XA's design represents the first major advancement in tribander technology in over 20 years! The conventional traps, coils, and capacitors have been discarded in favor of integral linear loading and hi-Q air capacitors, all composed of aluminum tubing. These give the KT-34XA a conservative power handling capability of 4 KW PEP and an unusually high level of operating **efficiency**. Linear loading also makes full ¼-wave elements possible on 15 and 10 meters, and brings 20 meters much closer to the desirable ¼-wave than any conventional tribander.

BANDWIDTHS:	14.0-14.350 MHz	**GAIN:**	8.5-9dB
	21.0-21.50 MHz		9-9.5dB
	28-29 MHz		11-11.3dB
VSWR:	1.5:1	**BOOM LENGTH:**	32 ft. x 3"O.D.
FB/FS:	20dB/40dB	**TURN RADIUS:**	21.5 ft.
FEED IMP.:	50 ohms w/balun	**WINDLOAD:**	9 sq. ft.
BALUN:	3-60-4:1 5KW PEP	**WT. (LBS.):**	75 lbs.
ELEMENT LENGTH:	24 ft.	**MAST:**	2" O.D. (standard)

Mechanically, the KT-34XA has been built to survive the toughest weather conditions. All aluminum, including the boom, is strong 6063-T832 alloy. All electrical hardware is stainless steel. Virtually indestructible "Lexan" insulators, just like those on KLM's 40 meter "Big Sticker," are used for mounting the elements and insulating them from the boom. KLM's 3-60 MHz 4:1 balun is supplied for direct connection to any 50 ohm feedline.

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mately 12 dB of gain. A single dual-gate MOSFET stage would provide 25 dB of gain, but could be quite unstable, especially in combination with my mast-mounted (low noise figure, 20-dB gain) GaAsFET preamplifier. Grounded-gate FETs have only about one-half the gain of a dual-gate MOSFET, but they have two big advantages: low noise and high stability.

The first stage, including the separately shielded L5, is also located on the bottom of the receiver module. A low-impedance tap on the coil connects to a 10- or 15-pF capacitor, then through a short piece of RG-174 50-Ohm coaxial cable up to the top side of the board and to the second grounded-gate stage where L5 and Q2 have separate shielded compartments.

The mixer stage Q3 is a dual-gate MOSFET. The broadband mixer output is made up of 1/4" toroidal core inductors. Although I had fixed capacitors across these coils, the exact capacity would depend on the variations in core material, so I suggest small variable capacitors across both L8 and L9.

Summing up, the components in the converter, the oscillator tank, and the tripler stage use toroid core coils as does the 24-to-28-MHz mixer stage. (Toroidal cores are available at a nominal fee from Amidon Associates, 12033 Otsego Street, North Hollywood CA 91607.) The Q6 120-MHz oscillator stage of the receiver does not have sufficient power for the transmitter mixer, so an additional stage Q7 was added. A 2N918 or 2N2222 can be used. There is at least 1.5 V rms at its output for a minimum of 45 mW.

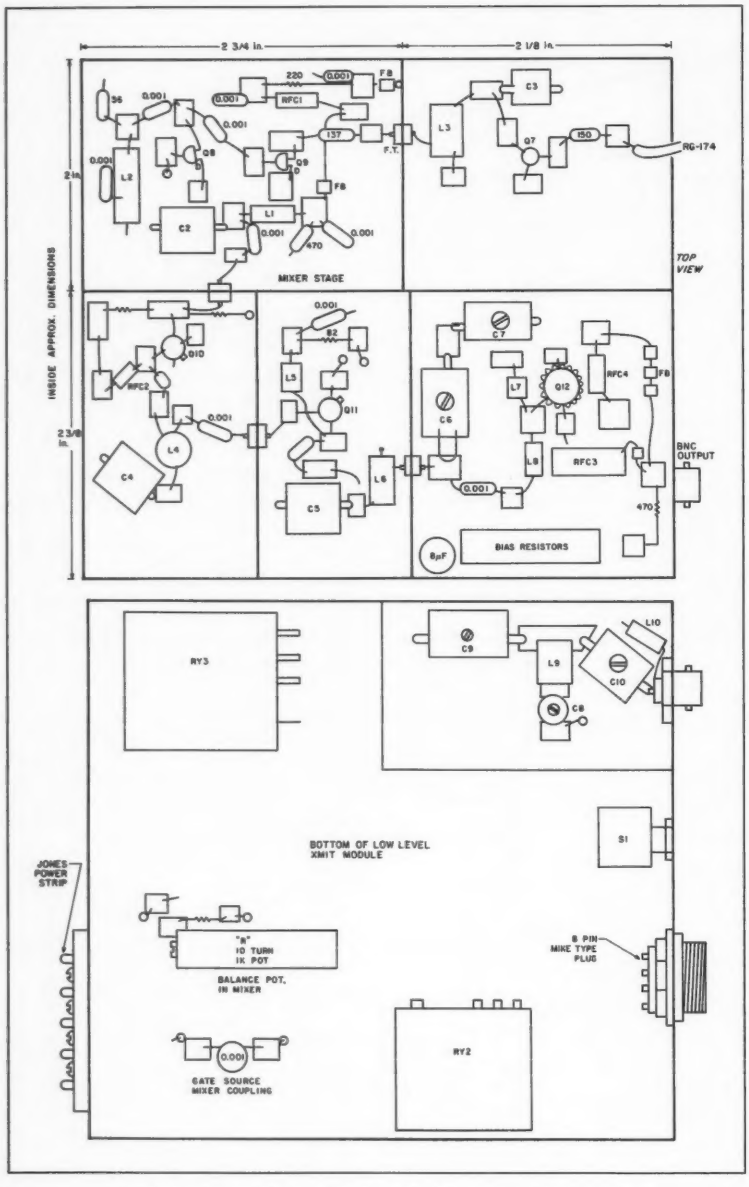

Fig. 4. Placement of parts in the low-level linear transmitter section.

Transmitter Mixer Circuit

I researched a myriad of possible mixer circuits, including both active and passive double-balanced designs. Each was rejected for one reason or another. Serious consideration was given to the passive double-balanced design. But major advantages were immediately apparent by substituting bipolar transistors for the diodes. This brought things into the active concept: bipolar versus MOSFETs. A comparison of major characteristics, such as dynamic range, suppression of intermodulation products, and cross-modulation effects, was performed.

FETs have inherent transfer characteristics approaching a square law response; thus, third-order intermodulation products are much reduced over that of the bipolar device. Harmonic distortion and cross-modulation effects are third-order dependent and are greatly reduced when FETs are used in an active balanced mixer. A secondary advantage is derived from the available conversion gain so that the FET mixer becomes simultaneously equivalent to both a demodulator and a preamplifier. Finally, the FET has an advantage in both signal conversion and local-oscillator noise reduction. In the final resolution, a single active balanced mixer using a pair of 2N5485 JFETs into a 50-Ohm configuration was selected.

The 24-to-28-MHz output from the TS-940 has a peak-to-peak output of about 100 mW. The 1.26 volts measured is about 31 mW rms. Its input to the mixer is at the 50-Ohm tap on the input toroid (L2). The 45 mW from the L13 tap from the Q7 stage provides a 120-MHz mixer output of approximately 0.5 volts rms.

The mixer potentiometer (R) should be adjusted for minimum 120-MHz signal in the mixer output. This should be observed on a scope or spectrum analyzer. If none is available, adjust the source resistance in Q8 to equal that in Q9.

The mixer output is amplified through three 120-MHz linear-amplifier stages. The Q10 stage at its low impedance output is 0.75 V rms. The output at a similar point at Q11 measures 2.0 volts rms. Each of these two stages uses 2N918 bipolar transistors. The third hard linear biased stage uses a 2N3866. The linear output measures between 400 and 500 milliwatts. When the 10-Ohm emitter resistor is paralleled with another of equal value, the output increases by another 100 mW. With the emitter connected directly to ground, the output is between 850 and 950 mW depending on the supply voltage of 12.5 and 13.5 volts. A small heat-sink hat should be placed on the 2N3866. The transistor normally runs cool to the touch but will heat up when swr is present.

Up to this point, the transverter was pow-

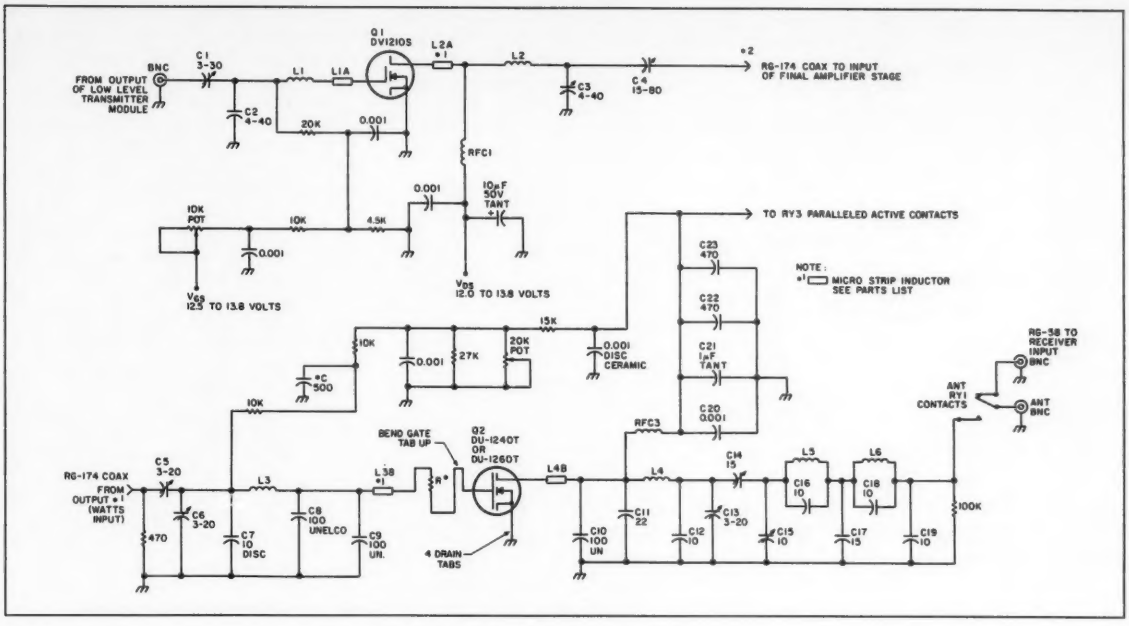

Fig. 5. VMOS-power power amplifier.

ered with a 1.2-Ampere hour 12-volt gell cell, and a range of 40 miles was conducted on SSB AM and FM during a test program.

VMOS Power FET 60-Watt Amplifier

The DU-1240T and 1260T are N-channel MOS power FETs operating in an enhancement mode, and they have generated one of the most interesting aspects of this program: VMOS—vertical metal oxide semiconductor field effect transistor. Up until a short time ago, VMOS was entirely new to me. These devices are not similar to bipolar transistors; they are more like vacuum tubes, but different from both. As examples: Bipolar transistors have low input and output impedances. The input and outputs look inductive; the hotter they get, the more current they draw, and thus they get hotter until they self-destruct.

VMOS or MOS power FETs are high-impedance devices (possibly higher than vacuum tubes), are capacitive devices rather than inductive, and the hotter they get, the less current they draw until they shut themselves off. Bipolar transistors are made for specific operating frequencies. As these devices have much more gain at lower frequencies, they are prone to self-oscillate at the lower frequencies; therefore, the voltage supply circuits must contain filters and bypassing for both high and low frequencies or else they will burn up.

VMOS, on the other hand, has a very flat frequency gain response and can be used at any frequency below the highest design frequency. Ideally, a 500-MHz unit can also be used at any low frequency. It is common to see a 400- or 175-MHz VMOS transistor used in a broadband 2- to-30-MHz amplifier. They can be biased for class A, B, C, D, and E operation. Oth-

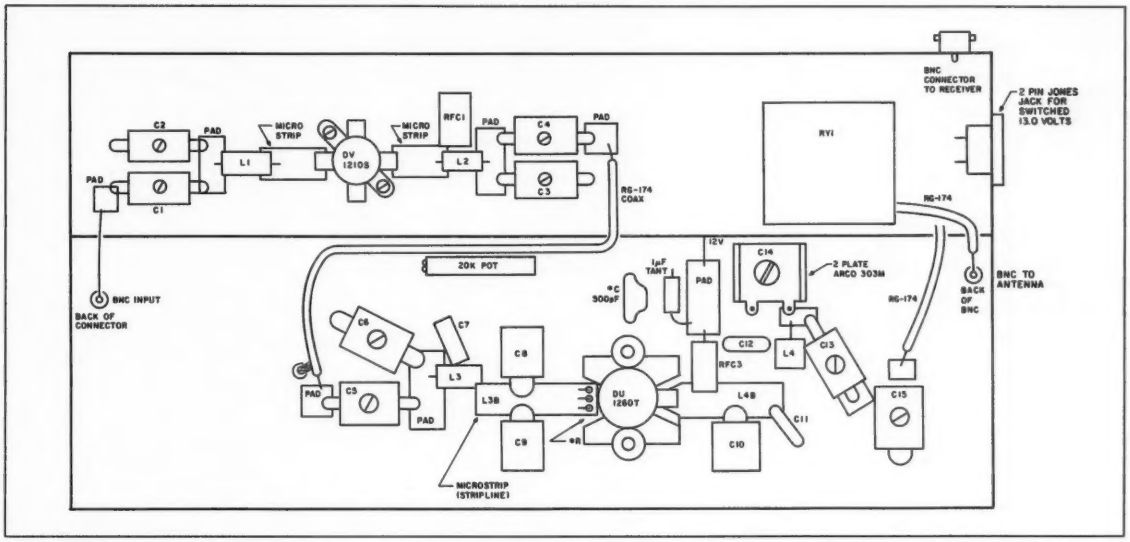

Fig. 6. Approximate orientation of major components for the power amplifier.

er than for low signal levels, bipolar devices cannot be used in class A operation and for the most part are made to operate in class C. Most manufacturers state that you cannot destroy a VMOS device by overdriving, and some will not admit to sudden failure in a new design because of oscillation.

In order to make a VMOS operate in class A or B, it is necessary to set up a quiescent drain current level by biasing the high-impedance input gate with a positive dc voltage level. The gate circuit has a thin barrier wall to the source. Self-oscillation can break down this wall in a few milliseconds, destroying the little devils. In a new circuit, they may have to be tamed.

Another feature that differs from the vacuum tube or bipolar transistor is that a common spec for mismatch tolerance is 30:1 vswr. The standard practice of M/A-Com Phi, Inc., one manufacturer of VMOS, is to test all of their production devices at an swr of 20:1. Junction temperature of the devices is 200° C (392° F). Nominal power gain is 10 dB; efficiency is 60% or better.

The three devices selected for use in this amplifier were the M/A-Com DV-1210S, DU-1240T, and DU-1260T, all 12-volt devices with linear output levels of 10, 40, and 60 Watts, respectively. Operating voltage is 12.5 volts. Maximum voltage for the drain is 45 V, source 30 V; total maximum device dissipation is 160 W and 240 W, respectively, for the 40- and 60-Watt units. On the 60-Watt unit V_{GS}, the gate to source bias voltage of 4 volts will produce a 6.0 Ampere quiescent drain current. (See Fig. 8.)

DV-1210S		DU-1240T		DU-1260T	
V_{GS}	I_D (Amperes)	V_{GS}	I_D (A)	V_{GS}	I_D (A)
1.5 V	0.0	2.0 V	0.0	1.5 V	0.0
2.0	0.020	2.1	0.100	2.0	0.500
3.0	0.200	3.0	0.600	3.0	2.0
4.0	0.550	4.0	1.5	4.0	4.0
5.0	1.0	5.0	3.0	5.0	6.0
6.0	1.5	6.0	4.0	6.0	9.0
7.0	2.0	7.0	6.0	8.0	10.5
8.0	2.5	8.0	7.5	10.0	11.0
9.0	3.0	10.0	10.0	12.0	12.0
10.0	3.5				
12.0	4.5				

Table 1. Typical transfer characteristics: I_D drain current versus V_{GS} gate voltage (drain voltage of 12.5 volts.

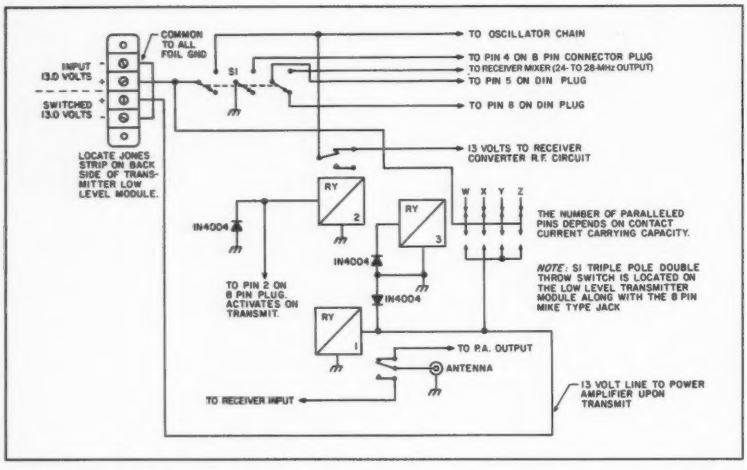
COMMON TO ALL FOIL GND
INPUT 13.0 VOLTS
SWITCHED 13.0 VOLTS
LOCATE JONES STRIP ON BACK SIDE OF TRANSMITTER LOW LEVEL MODULE.
S1
TO OSCILLATOR CHAIN
TO PIN 4 ON 8 PIN CONNECTOR PLUG
TO RECEIVER MIXER (24- TO 28-MHz OUTPUT)
TO PIN 5 ON DIN PLUG
TO PIN 8 ON DIN PLUG
13 VOLTS TO RECEIVER CONVERTER R.F. CIRCUIT
RY 2
RY 3
RY 1
W X Y Z
THE NUMBER OF PARALLELED PINS DEPENDS ON CONTACT CURRENT CARRYING CAPACITY.
IN4004
IN4004
IN4004
TO PIN 2 ON 8 PIN PLUG. ACTIVATES ON TRANSMIT.
NOTE: S1 TRIPLE POLE DOUBLE THROW SWITCH IS LOCATED ON THE LOW LEVEL TRANSMITTER MODULE ALONG WITH THE 8 PIN MIKE TYPE JACK
TO P.A. OUTPUT
ANTENNA
TO RECEIVER INPUT
13 VOLT LINE TO POWER AMPLIFIER UPON TRANSMIT

Fig. 7. Wiring and relay-switching diagram. Pins to the transverter plug on the TS-940S: 1 and 3—ground for coax shields; 2—12 volts @ 50 mA on xmit; 4—transverter on/off switch; 5—Rx signal from converter; 6—ALC external; 7—rf output to Tx mixer, 24 to 28 MHz (vfo); 8—940S HF receiver signal connects to pin 5 for normal xmit operation of 940 on HF (connects to RY3).

Physical Placement of Components

It is important to connect both top and bottom foil surfaces of the PC board together at a number of points around the perimeter and at two points near the source of both power transistors. Drill #55 or smaller holes and feed a small gauge tinned wire through each hole; solder on both sides of the board.

It will be necessary to cut rectangular holes in the board for the heat sink of both transistors. Allow just enough clearance for the transistor mounting to pass through the hole. There should not be more than 1/16″ overall clearance—that's 1/32″ all around.

Mount the transistors with H-40 thread machine screws. This means careful drilling and tapping. Take it easy and use a lubricant when tapping. The DV-1210S transistor package has four terminals with a cross configuration in respect to the heat-sink mounting; therefore, the rectangular hole will be 45 degrees to the line of input/output.

The DU-1240T and 1260T transistors have six tabs. The outer four tabs are the source,

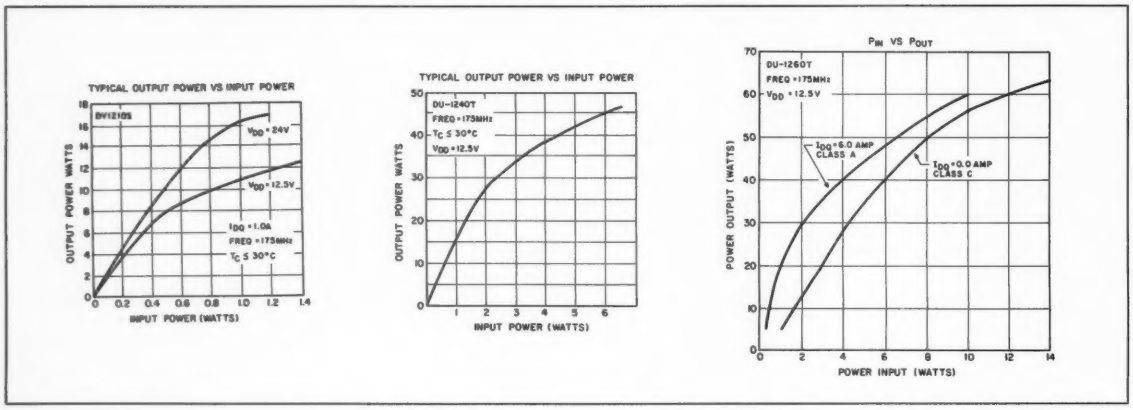

Fig. 8. Power input versus power output for the DV-1201S, DU-1240T, and DU-1260T, plotted with data from Table 1.

and eventually get soldered to the top foil. The cutout for these transistors is at right angles to the direction of component layout.

Referencing the schematic (Fig. 5), you will notice a rectangular box at both the gate and drain of each transistor. This is a small stripline inductance etched into the foil. You might wonder why this is not made up like a large solder pad. The additional 1/16" board thickness would put a strain on the transistor tabs. The PC board is already raised above the heat sink by about 3/32", or almost the thickness of two boards less foil. You do not want the PC board material to pick up the radiated heat from the heat-sink material. If you want to experiment, you will have to reduce the board clearance by about 1/16". The rectangular inductances are called out as L1A and L2A on the driver stage and are about 1/2" long. L3B and L4B on the more critical final are 1" long.

On the final stage, it will be necessary to taper the ends of the inductors closest to the gate and drain so that the grounded source tabs do not touch them and short the gate or drain. It is also prudent to make a diagonal cut away of the source tab material on the inner edge of all four tabs.

Note the resistor *R at the gate of DU-1260. This was necessary to set up a negative feedback voltage to prevent oscillation. Take three 10-Ohm carbon 1/4-Watt resistors and prepare them as follows:

Cut one end to a length of approximately 5/32" and bend it at a right angle to the resistor body. Bend the other end back along the body of the resistor, approximately 3/8". Bend the gate transistor tab upward 90°. The 3/8" lead of each of these resistors is sweat-soldered to the rectangular inductance, and the resistors stand vertically up from the board. These may not be necessary if the stage is stable. I used them with the 40-Watt device, but the 60-Watt device required more drive, which was reduced with the resistors in the circuit. I did not use them in the 60-Watt amplifier.

The Unelco or Underwood noninductive 100-pF C8 and C9 capacitor tabs are soldered to the center of the rectangular inductance, one capacitor on either side (across from one another with tabs almost touching). Solder the capacitor cases to the foil ground. C10 (100 pF) connects to the midpoint of L4B. The RFC3 connects midway between the C10 tab and the drain. C11 (22-pF) connects to one corner of L4B. The coil (L4) connects at a point next to the C11 connection. You will need a 1/2" x 1/4" solder tab placed in a direction inboard and at right angles to the input end of L4B.

There are four components with one of their ends connected to the pad: the output end of L4, C12, C13, and C14. If the output harmonic filter is incorporated, C15 will be a 10-pF fixed disc ceramic NPO. If not, this becomes a 3–20 (approximately) variable mica compression trimmer (Arco #422 or equivalent).

I did not incorporate this filter in my design. Instead, I made up a separate module using BNC connectors and a T filter picked

Receiver Converter Major Components Parts List

C1, C2	1–7-pF miniature piston type
C3, C7, C8, C15, C16	2–12-pF 8-plate E. F. Johnson or equivalent
C4	3–18-pF plated air capacitor or equivalent
C5	4–20-pF 14-plate E. F. Johnson air capacitor or equivalent
C9, C10, C14	Miniature flat-wafer-type 7–40-pF variable
C11	4–35-leaf postage-stamp-type variable Arco or equivalent
L0	See text for variations on coil L0 in oscillator
L1, L3	7 turns #16 tapped at 1-1/2 turns from ground end
L2	32 turns #24 on T-50-12 toroid core or 27 turns #26 on T-37-10 core (1 pF on L2 can be a low selected value to set the 88-MHz notch.)
L4	5 turns #18, 5/32" tapped at 1-1/4 turns and 1-3/4 turns from ground end
L5	5 turns #18 wound on the threads of a 1/4" 20-bolt tapped at 3/4 turns from ground end
L6	5 turns #18, 5/32" diameter tapped at 1-1/4 and 1-3/4 from low end
L7	5 turns #18, on 1/4" 20 bolt
L8	4 turns #18, on 1/4" 20 bolt set at right angles with L7
L9	15 turns #28, on T-25-6 Amidon toroid core
L10	14 turns #28, on T-25-6 Amidon toroid core tapped at 4 turns
L11	15 turns #18 on T-50-12 core
L12	4 turns #18 on T-50-12 core tapped at 1 turn
L13	4 turns #18 on 1/4" 12 x 20 bolt tapped at 1/4 and 1/2 turn from ground end
Q1, Q2	2N5485 or 2N5486 or equivalent JFETs
Q3	40673 dual-gate MOSFET or equivalent
Q4	2N3563
Q5	2N4221 JFET or equivalent
Q6	2N918 or equivalent

Low-Level Transmitter Major Components Parts List

L1	7 turns 1/8" #18 enameled wire, 1/8" inside diameter close wound
L2	27 turns, #22 enameled wire tapped at 14 turns, wound on T-50-12 core
L3	5 turns #18, 3/8" tapped at 3/4 turn on cold end
L4	5-1/4 turns #18, 3/8" diameter tapped at 1/2 and 1-1/2 turns from hot end
L5	.56-uH RFC
L6	4 turns #18, 9/32" diameter tapped at 1-1/2 and 2-1/2 turns from hot end
L7	3 turns #18, 1/8" diameter
L8	10 turns #28 enameled, on a 62-Ohm 1/2-Watt resistor
L9	5 turns #18, 1/4" diameter
L10	6-hole ferrite #43 material, .394" long and .236 o.d. or #73 material .437" long and .062 o.d. (Amidon Associates or equivalent, 3 turns #28 wire)
RFC1	1 uH
RFC2	.56 uH
C1	56 pF to broadband resonate L2, 24 to 28 MHz
C2–C5	2–12-pF 8-plate E. F. Johnson 189-503-45 or equivalent
C6–C10	7-45 or 7-50 leaf-type mica compression trimmers type 403 or 235-7345-P026 Arco #422 or #426 or equivalent
Q7	2N2222
Q8, Q9	2N5485 or 2N5486
Q10, Q11	2N918
Q12	2N3866
	1 miniature TPDT switch
1-8	Pin special DIN plug from Kenwood
1-8	Pin mike jack, male from Henry Radio
1-8	Pin mike plug, female from Henry Radio
RY3	4-pole double-throw 12-volt (small RY with stout contacts)
RY2	SPDT 12-volt (heavy gold-flashed contacts)
RY1	A small relay similar to RY2 to be situated in the power amplifier for antenna switching
1N4004 or 1N4005	3 each, to be used as transient suppressors across the relay coils

Except for critical circuits, most values of capacitors and resistors are ±30%.

Power MOS Amplifier Major Components Parts List

Q1	DV-1210S power MOS transistor, M/A Com Phi, Inc.
Q2	DU-1240T or DU-1260T as above
L1	4 turns #22, close wound, 1/8″ inside diameter (enameled)
L2	3 turns #20, close wound, 1/8″ inside diameter (enameled)
L3	3 turns #20, 5/32″ diameter, enameled, close wound
L4	2 turns #20, 5/32″ diameter, enameled, 5/32″ diameter
L5, L6	Filter optional, 2-1/2 turns #20, 5/32″ inside diameter
L1A, L2A	Are strip line inductances etched or scribed into the PC board material, 1/2″ x 1/4″
L3B, L4B	Are strip line 1″ x 1/4″ in PC board
RFC1	8 turns #20 enameled, 1/4″ inside diameter, close wound
RFC2, RFC3	9 turns #20, 5/32″ inside diameter, close wound
C1, C2	Small compression mica trimmer capacitors Arco or equivalent
C3	Small compression trimmer as above, 15–80 pF
C4	As above in 4–40 pF
C5, C6	As above in 3–30 approx.
C7, C12	10-pF disc ceramic short leads
C8–C10	100 pF Underwood, Unelco, or other non-inductive leadless capacitor
C10	Can be variable
C11	22-pF short lead disc ceramic
C13	3–20 compression mica capacitor (1″ size body), preferably if running 60 Watts
C14	Arco 303N 10–80 pF
C15	3–25-pF 303N 10–80 pF
C16, C18, C19	10-pF NPO disc ceramic
C17	15-pF mica ceramic
C20	.001 disc ceramic
C21	1-uF tantalum
C22, C23	470-pF disc ceramic or short-lead dipped silver mica
*R	See Text. 3 each 10-Ohm 1/4-Watt carbon resistors
*C	500-pF low-inductive capacitor

Use .001 disc ceramics in the 13-volt line whenever entering a new branch.

Underwood/Semco metal-clad noninductive rf mica capacitors and other hard-to-locate items are available from Communications Concepts, Inc., 2648 North Aragon Avenue, Dayton OH 45420.

out of the fourth edition of the *RSGB VHF/UHF Manual*, chapter 7. (*Modified T filter*—Two 1/2″-diameter 4-turn coils spaced 3/8″ on a single winding of #14 tinned wire, spacing of one wire diameter between turns. A 2–22-pF Arco capacitor from junction to ground. Case made of double-sided PC board. 2-1/4″ x 2″ x 1-1/4″ outside dimensions. Ends of coils grounded to sides of case just below BNC connectors. End coils tapped at 3/4 turn, each connected to a BNC connector. Tap should be matched for 50 Ohms using Bird 43 power meter and 50-Ohm termination and reflected power mode. Output of coil finally matched to antenna filter is tuned to center of 2-MHz band segment prior to the optimum adjustments.)

A 1″ high double-sided shield is placed lengthwise between the driver stage and the final. A short length of RG-174 or better 1/8″ coax runs from the output of Q1 to the input of Q2.

After verification that you have the proper output from the 3866 stage, power up the driver stage of the amplifier only. First, temporarily terminate the 1210 stage with a 50-Ohm resistor. Set the gate voltage to about 3.5 to 3.8 volts for a drain current of 400 mA.

At this point, you could really use two Bird 43 power meters as you want to adjust Q1 for maximum output. I suggest applying only about 11.0 volts to the Q1 stage. Monitor the temperature of the 3866. Adjust the input of Q1, C1, and C2 for minimum swr to the 3866. Once the input is adjusted, the wattmeter is placed in the output of Q1 and adjusted for 5 Watts output. Adjust the 10k gate voltage pot to set the output. See Fig. 8 and Table 1 for plots and data of output versus drain current. Connect the RG-174 coax to the input of Q2 (remove the 50-Ohm resistor load).

The final amplifier is adjusted with the power meter connected to the output of the amplifier. This adjustment is easier than the lower stages as we have no concern with swr when using VMOS. Just adjust C5, C6, C4, and C15 for maximum output. Apply operating voltage and adjust gate voltage for proper quiescent drain current and power output. And, yes, the 2N3866 transistor still operates linear unless it gets very hot.

At 400 or 500 mW, I still recommend the small heat sink; 400 mW runs very cool and is sufficient to drive the amplifier to its full nominal output of either 40 or 60 Watts depending on the output transistor chosen.

VMOS Power Amplifier

I am so enthused by the improvement of MOS power operation over that of bipolar transistors and, yes, even to that of vacuum tubes that I predict that within the not-too-distant future we will witness an almost complete replacement of bipolar transistors by the use of VMOS or UMOS technology. From what I understand, UMOS is just an improvement in the MOSFET technology that has evolved into the standard—a vertical planar four-layer semiconductor process called DMOS or double-diffused MOS.

The manufacturer's specification sheets emphasize the following features for VMOS power FETs in the N-channel enhancement: infinite vswr; no thermal runaway; broadband capability; class A, B, C, D, and E; low noise figure; high dynamic range (typical 10 dB); simple bias circuitry; and no problem finding devices to 120 Watts and linear to 500 MHz at 12 and 28 volts. Units of 100 volts to 150 Watts at 175 MHz with 17 dB of gain are also available.

Final Construction Notes

The measurements given for the placement of the shield can be varied. Don't forget to drill holes or notches in the divider shields to accommodate feedthrough wiring, before you solder the separators in place. A nice thing about this type of construction is that should you change your mind for the position of a solder pad once it has been put in place, you can remove it by prying it up with a sharp thin screwdriver. Sometimes it takes a little doing as this glue really holds.

You might at this point note that RY2 and RY3 are both located on the bottom of the low-level transmitter module, while RY1, the antenna relay, is mounted on the power amplifier board in the shielded compartment with the driver transmitter Q1. The relays having plastic cases are held in place with double-backed tape. Yes, it holds very securely.

The Q1 first grounded-gate receiver amplifier stage along with the bandpass filter and the .88-MHz filter are located on the bottom of the converter module. Also on the bottom side are some components of the local-oscillator stage—source voltage filters, the oscillator 12-volt regulator chip, the oscillator bias resistors, the L0 inductor, and the C12 oscillator tuning capacitor.

The 12-volt oscillator regulator was used to stabilize the oscillator frequency. It was found that the oscillator frequency would shift a couple hundred cycles if the main power-supply voltage was variably set to 12.5 V, 13.0 V, or 13.5 V—the main supply necessary to supply the voltage and current (power) to the final amplifier.

There is a considerable amount of extra room on the bottom side of this module. The 78L12 regulator chip can actually go almost anywhere thereon. I placed it close to one of the feedthrough capacitors furnishing voltage to the oscillator chain. Like the Q4 oscillator, it also regulates Q5 and Q6 of this chain.

The oscillator chain voltage remains on

during both transmit and receive. Receiver front-end source voltage is removed during the transmit mode, while source voltage to the transmit stages is removed during receive. Refer to the relay circuit for the voltage distribution cycle.

You will note that the first rf stage has the output circuit isolated by a shield. It might be prudent to flip the physical positioning of the two sections as this will shorten the RG-174 coax to a fraction of an inch in length. There has been no problem from this; it just makes a better layout to flip the sections.

Transmitter Low-Level Linear Amplifier

The 13-volt supply line is well-filtered not only in the low-level linear amplifier module, but also through the entire transverter. You may have noted the high quantity of .001-uF capacitors used. These are small disc ceramics with a 100-volt dc rating. All resistors throughout are 1/4 Watt unless specifically shown otherwise.

The low-level amplifier has an output power of 400 mW. The Q12 2N3866 presently has a 10-Ohm resistor in the emitter. This value can be reduced to zero if needed. By shunting a second 10-Ohm 1/4-Watt resistor to that already in the emitter, you can increase the power output to 600 mW. Placing the emitter directly to ground increases the output to 0.8 Watts or 0.9 Watts when feeding the VMOS amplifier input at low swr. If, however, the swr rises, the Q12 transistor will heat up. A small heat-sink hat should be placed around the case.

Tuning Notes

Since the transmitter is more broadbanded than the receiver, it covers the full 4 MHz easily when adjusted at the band center. The receiver will cover the full 4 MHz, but will lose resonance at the band ends. If your greater interests are with OSCAR 10 and single sideband, peak the receiver rf stages for 145 MHz to efficiently cover 144 to 146 MHz. Now, even though there will be some gain sacrificed at the high end, the power of the repeaters in this band segment will overcome the small loss in gain.

If there is anything of question that I have not included, feel free to drop me an SASE with your comments and questions. I am quite sure that once involved with this project, you will find it most enjoyable and will discover the real rewards of operating in any mode. ■

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"VHF/UHF World," Joe Reisert W1JR, *Ham Radio*, August, 1985.

"Power FETs: Trend for VHF Amplifiers," Robert S. Larkin W7PUA, *Ham Radio*, January, 1984.

"Solid State SSB Exciter," Robert E. Bloom W6YUY, *73*, December, 1970.

"Design a Toroidal Tank Circuit for Your Vacuum Tube Amplifier," Robert E. Bloom W6YUY, *Ham Radio*, August, 1985.

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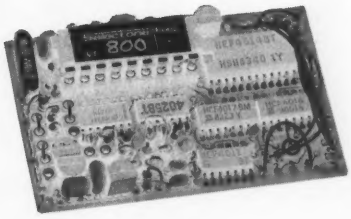

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I fell in love with packet radio the first time I sat down at a terminal and gave it a whirl. The commute time repeater talk gave no hint about thrills available. Protocol, hardware, and software discussions were a big yawn. I spend all day with that stuff. To connect or not to connect, that was the question.

First Time

My first experience with packet was with the Honeywell W1DC 1200 Radio Club TNC-2, 2m rig, and VIP7813 terminal (Fig. 1) during lunch in the club room. KA1MI walked me through the power-up procedures and parameter settings, then explained how to connect to the K1BC and WA1RAJ BBSs (computer bulletin boards accessible only via packet radio). These BBSs are accessible from our Billerica, Massachusetts, plant on 145.090 MHz. The 7813 terminal was exciting because it is one of the series of terminals that my communications software is designed to support. Previously, all I had ever seen on the 7813 terminal was boring old customer-type displays. Numbers, orders, banking, databases, dumps, yucch. Seeing ham calls, satellite info, requests for help, answers to the requests, even ARRL bulletins coming across the screen was too good to be true.

Modem Access

My first challenge was how to make the fun of the lunch hour available outside of the club room. Very fortunately, the 7813 terminal has an auxiliary RS-232 port. Connecting a RIXON 212A modem to the auxiliary port and commandeering the W1DC repeater phone forced me to split my afternoon into two work breaks surrounding some very serious serial communication (Fig. 2). (I have one Honeywell PC, two Honeywell 6/10s with MS-DOS, one VIP7201, three phone lines, four modems, two 9600-baud modem bypasses to network facilities, hundreds of feet of RS-232 cable, and the constant evil eye of the safety committee.) Returning the repeater phone to normal operation left me with an empty feeling.

Neat Stuff

During the time that the TNC-2 was available by modem, I tried hooking up my Honeywell PC with both public-domain and proprietary terminal emulators. I accessed the K1BC board and practiced sending and receiving mail automatically. I sent my first transcontinental mail to NK6K. Three days later I got my response. Electronic mail from MA to CA takes about 6 hours and about 4 hops. Pretty neat for a reliable and FREE service. The modem access to the packet board leads naturally into the idea of modem bypass (just a pair of electronic thingies to turn multiple hundred feet of wire into an RS-232 connection). I approached KA1MVM with the idea of setting up a modem bypass from our largest multi-user mainframe to the packet board. The connection would be a one-way connection to be used by a user logged onto the mainframe. The user would use mainframe connect functionality to the port that is modem-bypassed to the club room.

Mainframe Access

It didn't take too long a sales pitch to get the wires run from the mainframe to the club room. We hooked the modem bypass to the auxiliary port on the terminal, then ran off to another office to dial into the mainframe and see how it worked (Fig. 3). It worked perfectly. The TNC-2 board, 2m rig, and piggyback connection to the 7813 are now accessible from the mainframe. We can connect from the mainframe using the W1DC packet station as a one-at-a-time shared resource.

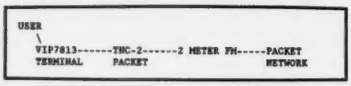

Fig. 1. The W1DC packet station.

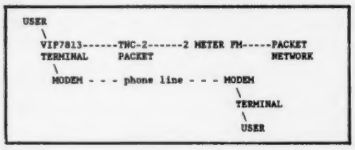

Fig. 2. The W1DC packet station with modem access.

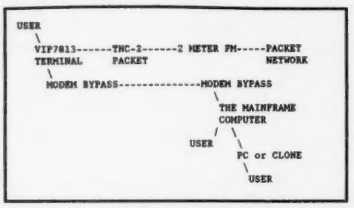

Fig. 3. The W1DC packet station with mainframe access.

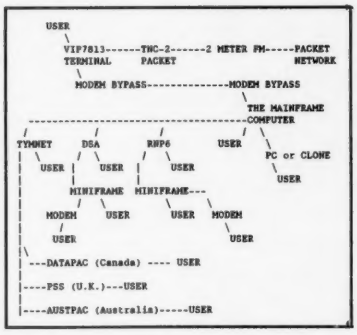

Fig. 4. The W1DC packet station with world access.

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Security

Once the access was available, KA1MVM (a mainframe system administrator) took

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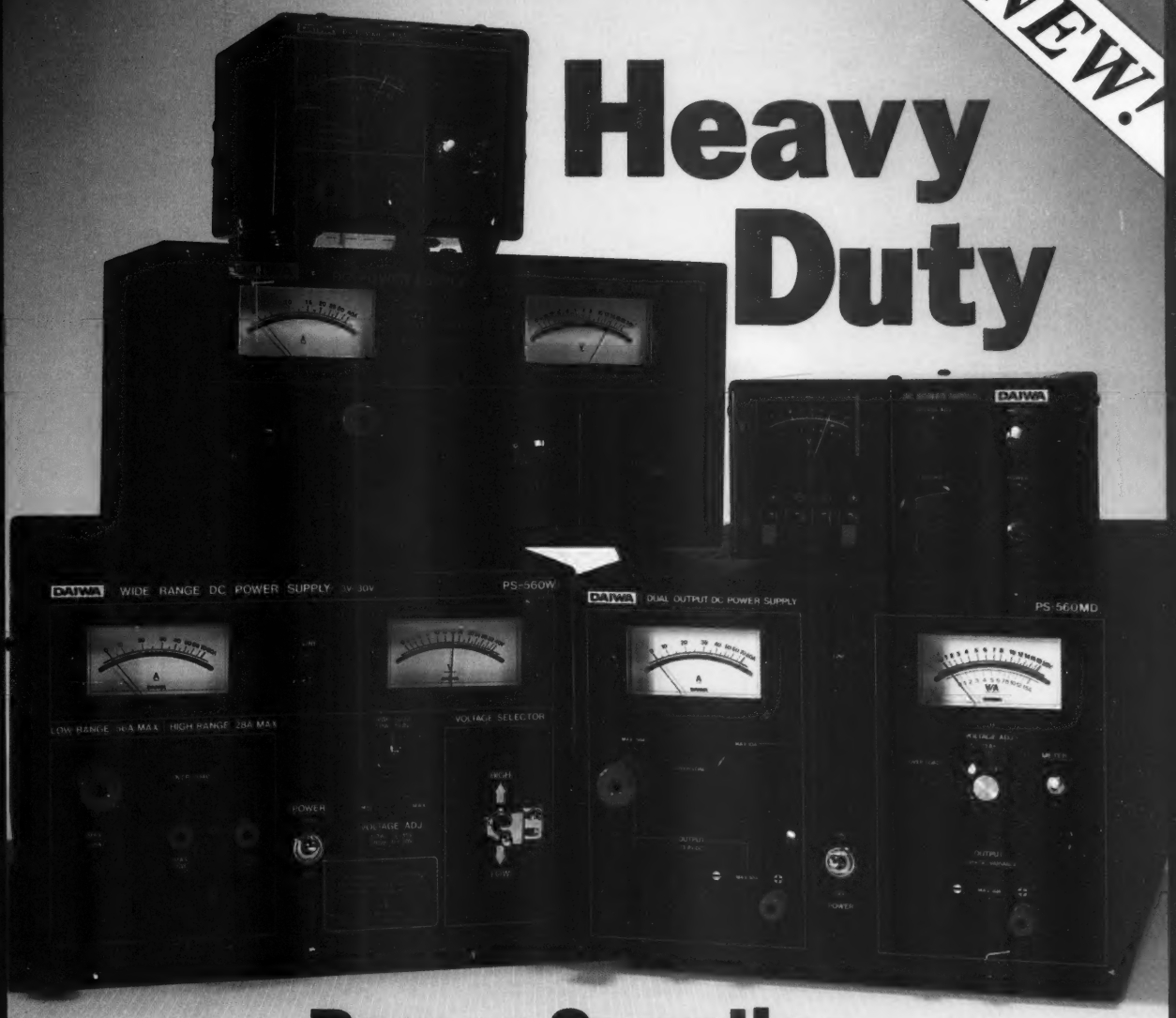

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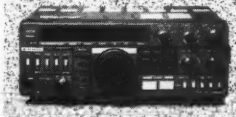

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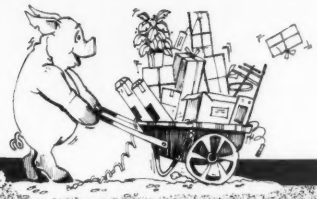

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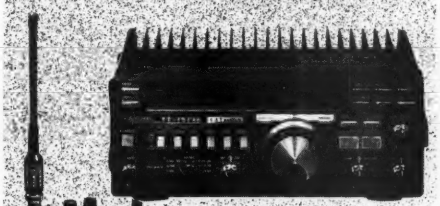

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over the task of collecting copies of the licenses of the hams who wished to participate. The mainframe has B2 security. B2 security is an excellent rating from the standards set by the Department of Defense. The standards rate just how hard it is to break the defenses of the computer. This security is very tight and we feel that it provides more than reasonable protection against improper usage of the packet station. This article has been security screened to make sure that I don't give away the keys to the farm in the process. The mainframe is purposefully not identified. In truth, any of our mainframes or minis or maxi-micros or whatever the marketing types are selling them as can give a connection to a 1200-baud asynchronous 7- or 8-bit line that is perfectly connectable to a packet system. We have LANs, WANs, DSAs, RNP6s, SNAs, and tons of other acronyms that can be connected to the packet system.

Non-Ham Access

To take another step into the bigger picture, we have included the general Honeywell mainframe community into enjoyment of packet radio. Honeywell has "electronic meeting" software that allows any number of people to participate in an ongoing meeting resident on the mainframe. You attend the meeting at any time you wish while logged on the mainframe. You can enter messages into a meeting in the same way that you leave messages on a BBS. The difference is that there can be hundreds of different meetings and topics available on the mainframe, as opposed to the single "meeting" on the BBS. Also, the BBS has many selective messages directed from one ham to another, while the "electronic meeting" is available to all who attend. Here on our mainframe we can connect to the packet system in such a way as to capture a file containing all the information that went by the screen. After disconnecting from the packet board, we can edit the "capture file" and place annotated sections into the "W1DC electronic meeting" for all to enjoy. Our "electronic meeting" on the mainframe is the place to air problems, resolutions, general bulletins, club information, etc., for ham and non-ham alike to enjoy.

World Access

The present/future configuration of our world access plan is shown in Fig. 4. Our mainframe is accessible by a variety of network connections. TYMNET is a paid public network connection that provides character-by-character transfer from a remote user at a terminal to and from the mainframe computer. The TYMNET user can be anywhere in the USA or possessions and use a modem to dial a local telephone number in the nearest major city (and many minor ones as well). TYMNET is merely acting as the carrier of the data in much the same way as the phone company is acting as the data carrier if you convert your data into sound with your modem.

Bigger Picture

Stepping back even further: TYMNET is connected with similar paid public networks in major countries worldwide. I have used DATAPAC in Canada and PSS in the U.K. to access the mainframe during business trips. On my next business trip I will have the choice of accessing the W1DC packet station from anywhere on earth. The paid data networks will transport my keystrokes from my distant earthly location to beautiful downtown Billerica, Massachussetts. If I choose, I may use the mainframe connect function to pass my keystrokes to the piggyback connection on the VIP7813 terminal in the club room at the top of the tower building.

Piggyback

The piggyback connection is a really neat thing in itself. If I am in Timbuktu, going through this monster connection, connected to the auxiliary port of the 7813, I can work in parallel with the local operator. What he types, character by character, appears on the local screen AND on mine in Timbuktu. What I type he sees. Actually, the character I type travels the entire route to the packet board where it is echoed back. The echoed character goes to the local screen AND out the auxiliary port, over hill and dale, to my screen. It is easy to double...I can obliterate what the local operator is typing. This is handy for interrupting and asking the local operator a question. The line can be deleted and it will never go out over the air. This is handy for changing frequency on the 2m rig from 12,000 miles away.

Legally Speaking

I maintain that this world access network is proper and secure use of amateur radio. The mainframe is manned 24 hours a day, 365.25 days per year. The station can be shut down from a number of locations along the path. Foremost, the operator at the keyboard IS in control, as certainly as if he were at the local keyboard. In the event of network failure, the security department is a phone call away and can yank the power to the packet room. Even though a non-ham is pulling the plug, it is at the express direction of a licensed amateur. This is wonderful stuff if used in the right spirit.

K1TE Philosophy

I was won over by the concept of "electronic meetings" on the mainframe long before I encountered packet radio. I found a great deal of fun and help available by both reading meetings and asking questions in those meetings. If you have a question, ask it. Let the question ferment a couple of days on an "electronic meeting" or BBS and see what comes of it. Maybe it needs rewording. Maybe you will be given a thread of the answer to follow to another place. There is a lot of information available from a lot of sources worldwide, and packet radio is a terrific way tap into it. ■

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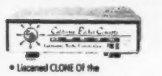

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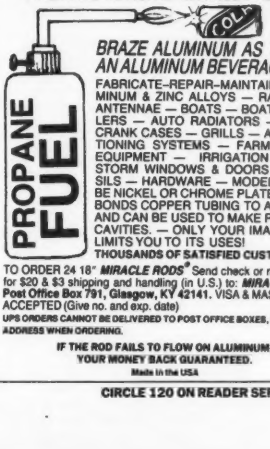

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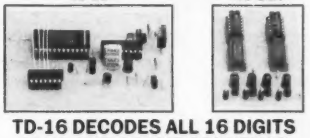

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SPECIAL EVENTS

COBOURG 150TH
JUN 22–JUL 5

The Heritage ARC will use the special prefix VX3 from June 22 to July 5 to commemorate Cobourg's Sesquicentennial. Operation will take place in a section of the art gallery in historical Victoria Hall in Cobourg, Ontario. CW operation will be on 3.550, 14.050, and 21.025. SSB operation will be on 3.800, 14.143, 14.200, and 21.250. RTTY operation will be on 14.180. Two-meter operation will be on 146.550. Special QSL cards have been printed, and it is planned to exchange greetings with Coburg, Australia; Coburg, W. Germany; and Coburg, Oregon.

MOFFETT FIELD CA
JUL 3–5

The Naval Air Station (NAS) Moffett Field, in cooperation with the NASA Ames Research Center ARC, will be operating a special event station during the annual NAS Moffett Field Open House this year. The dates are July 3–5, 1987 and the station, K6MF, will be on the air from 1600 UTC to 0100 UTC all three days. K6MF will operate on 14.280 MHz and 21.380 MHz, voice (A3) only. Special QSL cards are being prepared for the event. Send an SASE to: AARC, PO Box 146, Moffett Field, CA 94035. For more information, contact David Brocker WB6YGN—AARC President, 233 Barbara Dr., Los Gatos, CA 94035; (408)-377-9345 or (415)-694-5536 (days), or Mike Hastings KB6LCJ—Event Chairman, 2681 Barcells Ave., Santa Clara, CA 95051: (408)-243-6745 or (408)-744-5551.

CORNELIA 100TH
JUL 4

The Southern Piedmont ARC will operate WD4NHW on July 4 in celebration of the centennial year of Cornelia, Georgia, Home of the Big Red Apple. Listen for operation in the 20-, 40-, and 80-meter bands. For a certificate, send your QSL card and a 9" x 12" SASE to SPARC, PO Box 52, Cornelia GA 30531.

RIVERBOAT DAYS
JUL 4

The Clinton ARC will operate special-event station W0CS on July 4 to commemorate the Clinton, Iowa, Riverboat Days. Suggested frequencies: CW—3.720, 7.120, 21.120, and 28.120; phone—3.875, 7.275, 14.275, 21.375, and 28.400; 2-meter FM—146.460; 2-meter SSB—144.210. To receive a certificate, please send a #10 SASE to Darryl Petersen KD0PY, RR #1, Box 84, Bryant IA 52727.

FESTIVAL OF NATIONS
JUL 4

The Chatham Kent ARC will operate VE3CRC on July 4, from 1200–2200 UTC, to celebrate Chatham Ontario's Festival of Nations. Phone and CW on 80–10 meters, packet and phone on 2 meters. Certificates for a QSL card to Cliff Russell VE3NGG, R.R. #1, Chatham Ontario N7M 5J1.

HARRISBURG PA
JUL 4

The Harrisburg RAC will sponsor the 15th annual Harrisburg Firecracker Hamfest on July 4 at the Bressler Fire Co. picnic grounds near Exit 1 of Interstate 283, midway between the Pennsylvania Turnpike and Interstate 83. Follow PA 441 N and signs to the site. Tailgating at no charge with $3 admission. XYL and kids free. VE exams will be held nearby starting at 9 a.m. Talk-in on .52 and .16/.76. For additional details and table reservations, contact Dave KC3MG, 131 Livingston Street, Swatara PA 17113; (717)-939-4957.

STATER BROS. CELEBRATION
JUL 4

The Valley ARA will sponsor a special-event station at the Stater Brother's "Happy Birthday U.S.A. Celebration" in Staunton, Virginia, on July 4, from 8 a.m. to 8:30 p.m. on 14.250, 3.850, and 7.230 MHz. A 9 x 12 SASE is required for a special certificate. Mail to N4ICT, PO Box 1091, Staunton VA 24401.

WILKES-BARRE PA
JUL 5

The Murgas ARC will sponsor its 8th annual Hamfest and Computerfest on July 5, beginning at 8 a.m., at the Ice-A-Rama, Coal St. Sports Complex, Coal Street, Wilkes-Barre, Pennsylvania. Donation: $3; XYLs and children under 16 free. Outdoor tailgating: $2, bring your own table. Indoor selling: $8 per space, includes a table, but please reserve in advance. FCC exams given at 10 a.m. Talk-in on 146.61, 53.61, or 146.52. For more information, contact K3SAE, KB3GB, RD. 1, Box 214, Pittston PA 18643; (717)-388-6863.

NATIONAL SOARING CHAMPIONSHIPS
JUL 5–12

From the new National Soaring Society Headquarters, the State Line ARC will operate special-event station KT5I to celebrate the 1987 National Soaring Championships (open class). Operation will be on all bands from 10–80 meters on July 5–12. For a large certificate, send QSL and contact number to State Line ARC KT5I, PO Box 1423, Hobbs NM 88240.

MONTEREY CA
JUL 7–9

The Naval Postgraduate School ARC (K6LY) will operate a special station aboard the *USS Missouri* (BB-63) during "Fleet Week Monterey," in conjunction with the celebration commemorating the Great White Fleet journey of 1907–1909. Special event is set for July 7–9, 1700Z–0100Z. Suggested frequencies are the lower 50 kHz of 20 and 15 meters for phone and the Novice portion of ten meters. A commemorative QSL card will be available. Send QSL and SASE to NK6H, 96 Cuesta Vista Drive, Monterey CA 93940.

EAU CLAIRE WI
JUL 11

The Eau Claire ARC will hold its annual Hamfest on July 11, from 8 a.m. to 2 p.m., at the 4-H buildings on Fairfax Street (behind Highland Mall) in Eau Claire, Wisconsin. Tickets: $2 in advance, $3 at the door. Free tables. VE tests given from 9 a.m. to 1 p.m.—all walk-ins. Talk-in on 147.84/.24. For information/tickets, send an SASE to Gene Lieberg KA9DWH, 2840 Saturn Avenue, Eau Claire WI 54703.

PETOSKEY MI
JUL 11

The Straits Area ARC will hold its Swap and Shop and Computer Demonstration on July 11, from 9 a.m. to 2 p.m., at the Petoskey, Michigan, Fairgrounds. Donation: $2.50 at the door. 8' table: $3, splits allowed. Talk-in

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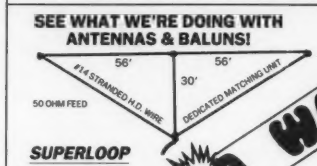

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POUGHKEEPSIE NY
JUL 11

The Mt. Beacon Hamfest will be held on July 11, from 8 a.m. to 3 p.m., at the Arlington Senior High School, Poughkeepsie/Lagrange, Dutchess County, New York. Admission: $3. Tailgating space: $4 (one free admission). Table: $6 (one free table and admission). Talk-in on 146.37/.97 and 146.52. For additional information, contact Julius Jones W2IHY, RR2, Vanessa Lane, Staatsburg NY 12580; (914)-889-4933.

MAPLE RIDGE BC
JUL 11-12

The Maple Ridge Hamfest will be held on July 11–12 at St. Patricks Center, 22589 121 Avenue, Maple Ridge, B.C. Admission: hams, $6; non-hams over 12, $3; under 12, free; two hams in family, $9. Talk-in on 146.20/.80 or 146.34/.94. For more information, write to Floyd Beardsell VE7HI, Box 292, Maple Ridge BC V2X 7G2.

BUNSEITH ND
JUL 11-12

The 24th International Hamfest and Computerfest will be held on July 11–12 at the International Peace Garden between Dunseith, North Dakota, and Boissevain, Manitoba. Free space for vendors and flea market. Talk-in on .52. For more information, write NTARC, Box 2002, Minot ND 58702.

INDIANAPOLIS IN
JUL 11-12

The 17th annual State ARRL Convention and Hamfest will be held on July 11 and 12, beginning at 6 a.m. both days, at the Marion County Fairgrounds in Indianapolis, Indiana. Gate fee is $5. Children under 12 free. For information on inside flea market space, call (317)-356-4451. For information on commercial building space, call (317)-745-6389.

LAKE CANTON FIELD DAY
JUL 11-12

Oklahoma amateur radio operators will conduct their fourth annual Field Day exercises on July 11–12 at Lake Canton, Oklahoma in the "Big Bend" picnic shelter. Activities begin at 2 p.m. on Saturday and continue till noon on Sunday. The Lake Canton Field Day is held in conjunction with the annual IARU "Radiosport" DX Contest. Talk-in on 146.52 or 144.85/145.45. I-40 travellers should use 146.01/146.61. The Lake Canton Field Committee will provide a commemorative certificate for contacts with event stations WD5HPU, WA5LTM, and other amateur stations that officially operate from Lake Canton during the event. Operation will be in the General phone portions of the 40–10-meter bands and on 6- and 2-meter SSB. For a certificate or additional information, send QSL and large SASE to Tim Mauldin WA5LTM, Lake Canton Field Day, PO Box 19097, Oklahoma City OK 73144; (405)-521-5048.

HOLMDEL NJ
JUL 11-12

The Holmdel ARC will operate K2DR from 1500Z to 2200Z on July 11, and from 1500Z to 2000Z on July 12, to commemorate the 25th anniversary of of the launching of the TELSTAR communications satellite. Operation will be in the lower 25 kHz of the General 20-, 40-, and 80-meter phone bands (check at 15 minutes after the hour), and on 146.55 and/or 145.64 MHz FM. For certificate, send QSL and SASE to Holmdel ARC, PO Box 205, Holmdel NJ 07733. For more information, please contact Vincent Passione WA2ECP at (201)-957-3486.

BATTLE CREEK MI
JUL 11-17

W8DF will be operated as a special-event station from July 11–17 at the Battle Creek International Hot Air Balloon Championship. The station will operate on (SSB) 3.890, 7.240, 14.250, and (CW) 7.040 and 14.040. For a 9 x 12 certificate, send a large SASE to SMARS, PO Box 934, Battle Creek, MI, 49016. For more information on the event, write to the same address.

NORTH HILLS PA
JUL 12

The North Hills ARC will hold its 2nd annual Hamfest on July 12 at Northland Library, Cumberland Road, North Hills, Pennsylvania. Free admission and free vendor space (bring your own table). Amateur exams will be given; walk-ins welcome. Talk-in on 147.69/.09. For more information, call Bob N3DOK at 367-2393 or Rey W3BIS at 828-9383, or inquire on the 147.69/.09 or 146.28/.88 repeaters.

DOWNERS GROVE IL
JUL 12

The DuPage ARC will hold a Hamfest-Computer Show on July 12, beginning at 8 a.m., at the American Legion Grounds, 4000 Saratoga, Downers Grove, Illinois. Tickets: $3 at the gate, $2 in advance. Handicap facilities. VE license testing for all classes. Talk-in on 146.52. For tickets or table reservations, send an SASE to Hamfest Chairman, DuPage ARC, PO Box 71, Clarendon Hills IL 60514. For more information, call Ed at (312)-985-0527, Jim at (312)-964-5529, or Everett at (312)-495-1253.

BOWLING GREEN OH
JUL 12

The Wood County ARC will hold its 23rd annual Ham-A-Rama on July 12, beginning at 8 a.m., at Wood County Fairgrounds, Poe Road, Bowling Green, Ohio. Admission is free. Table rental, $7; trunk sales, $3. For reservations, contact Ross Mergenthaler NS8C, 2682 Joseph Road, Pemberville OH 43450; (419)-837-5270—or call Jackie Dicken KA8ZRJ at (419)-352-0856.

PETERSBURG NB
JUL 12

Using the callsign, KC0DA, The Buzzard's Roost Repeater Club will have a special-event station on the air from downtown Petersburg, NB to help the community celebrate their centennial. This event is happening on 12 July from 1500 UTC to 0000 UTC on 3.950, 7.250, 14.295 and 28.375 MHz. Possible CW operation. QSL with SASE to KC0DA, Larry L. Lehmann, 706 West Fairview Ave., Albion NB 68620.

MT CLEMENS MI
JUL 12

Eric NF0Q and Allan KA8JJN will operate NF0Q/8 from 1200Z to 2100Z to commemorate the 200th anniversary of the Northwest Ordinance of 1787. This special-event station will transmit on 7.250 and 14.325 as propagation and QRM permit. Secondary frequencies will be 21.350, 28.410, and Detroit area 2-meter repeaters. For certificate, send a large SASE to Eric Koch NF0Q, 2805 Westminster, St. Charles MO 63301.

SPICELAND FREEDOM DAYS
JUL 17-18

The Henry County ARC will operate special-event station N9WB on July 17–18, from 1500–2400 UTC each day, to celebrate "Spiceland Freedom Days." Frequencies: phone—3.870, 7.235, 14.235; CW—3.735, 7.135. SASE for certificate. QSL to HCARC, c/o Civil Defense, 1131 Broad Street, New Castle IN 47362; (317)-521-0582.

GREAT FALLS MT
JUL 17-19

The Great Falls Area ARC will sponsor the 53rd annual Glacier-Waterton International Hamfest at Three Forks Campground on the southern edge of Glacier National Park on July 17–19. Talk-in on .10/.70 and .52. For further information, contact Shirley Smith KC7OA, 1822 14th Avenue So., Great Falls MT 59405; (406)-452-5958.

OAK CREEK WI
JUL 18

The South Milwaukee ARC will hold its annual Swapfest on July 18, from 7 a.m. to 3 p.m., at American Legion Post #434, 9327 South Shepard Avenue, Oak Creek, Wisconsin. Admission is $3 per person. The Milwau-

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kee Volunteer Core Group will be conducting amateur radio exams. Talk-in on 146.94. For more details, including a map, write to The South Milwaukee ARC, PO Box 102, South Milwaukee WI 53172-0102.

CONVENTION DAYS
JUL 18–19

The Auburn ARA and the Seneca Co. ARES will operate W2CDS on July 18 and 19, from 1400–2200 UTC, during Convention Days, from the site of the first meeting place for women's suffrage. Suggested frequencies as time and conditions allow: phone—7.250, 14.250, 21.350, 28.350; CW—7.050, 7.125, 14.050, 21.050, 21.150, 28.150. For a certificate, send QSL and large SASE to W2CDS, 2485 Lower Lake Road, Seneca Falls NY 13148.

NASHUA IA
JUL 18–19

Great Plains ARC will operate station KC0 CP from 1400Z July 18 to 1700Z July 19, from the site of the little brown church on the vale. Frequencies will be 25 kHz above the lower edges of the General phone bands; FM 146.52 and SSB 144.220. For certificate, send QSL and large SASE to D. Muchow, Box 203, Oelwein, IA 50662.

NAPERVILLE IL
JUL 18–19

The Bolingbrook Amateur Radio Society, in conjuction with the city of Naperville, will be operating a special-event station to commemorate the Revolutionary War. It will be operating from 1400Z to 2100Z on 14.300 and 7.250 MHz ± QRM. For certificate, send QSL card and #10 SASE to: Special Events Chairman, Rich Wayne KE9DE, PO Box 495, Naperville IL 60566-0495.

AUGUSTA NJ
JUL 19

The Sussex County ARC will sponsor SCARC '87 on July 19, beginning at 8 a.m., at the Sussex County Fairgrounds, Plains Road, off Rte. 206. Registration $3. Indoor tables $7 each. Tailgate space $5. For more information, contact Don Stickle K2OX, Weldon Road, RD#4, Lake Hopatcong NJ 07849; (201)-663-0677.

WHEELING WV
JUL 19

The Triple States RAC will hold its 9th annual Wheeling Hamfest/Computer Fair on July 19, from 9 a.m. to 4 p.m., rain or shine, at Wheeling Park, in Wheeling, West Virginia. Admission is $3 in advance, $4 at the door. To reserve space, contact Carl Williams WD8PPS, 9 East High Street, Flushing OH 43977; (614)-968-3652. For tickets, contact TSRAC, Box 240, RD 1, Adena OH 43901; (614)-546-3930.

WASHINGTON MO
JUL 19

The 25th annual Zero-Beaters Hamfest will be held on July 19, from 8 a.m. to 3 p.m., at the Bernie H. Hillerman Park (Washington, Missouri, Fairgrounds). Free admission. Flea market space, $2. Limited covered rental space available. FCC exams. Talk-in on .84/.24 or .52. For more information, contact Zero-Beaters ARC, Box 24, Dutzow MO 63342; (314)-239-2072.

TRAP SHOOT
JUL 23–25

The Inland Empire ARC will operate a special-event station on July 23–25 from 1700–0800 UTC to celebrate the Muscular Dystrophy Associations's Trap Shoot and Chili Cookoff at Prado Tiro Olympic Shooting Facilities in Chino, California. Theme for the event will be "Shooting for a Miracle." Operating frequencies will be in the General-class portion of the 75-, 40-, 20-, and 15-meter phone bands. The station will also operate in the new Novice and Technician portion of the 10-meter phone band. A certificate will be issued via WA6ZEF when accompanied by a QSL card and a size 10 SASE.

DAVENPORT IA
JUL 24–26

The Davenport Radio Amateur Club will again operate W0BXR during the Bix Biederbeck Memorial Jazz Festival, 1700–2200Z July 24 and 1500–2300Z July 25–26. Operation will be on phone and CW, 80–10 meters, 10 kHz up from the lower end of the General-class band edges. Certificates for your QSL and SASE via Davenport Radio Amateur Club, 2131 Myrtle, Davenport IA 52804.

MARQUETTE MI
JUL 25

The Hiawatha ARA of Marquette County will sponsor the 38th annual Upper Peninsula Hamfest on July 25 at Northern Michigan University. For more information, write to Hamfest Chairman, c/o James F. Jacobson WD8DJA, 105 Raymbault, Marquette MI 49855.

TOPSFIELD MA
JUL 25–26

The Heavy Hitters Hamfest will be held on July 25–26 at Topsfield Fairgrounds, U.S. Rte. 1, in Topsfield, Massachusetts. Hours: Saturday—6 a.m. to 5 p.m.; Sunday—6 a.m. to 2 p.m. Tickets: $4 at the gate or $3 in advance. Children under 12 admitted free if with an adult. Vendors admitted at 5 p.m. Friday night. Send check to Heavy Hitters Hamfest, PO Box 411, Waltham MA 02254. Please include an SASE. VEC license exams given. Talk-in on 146.04/6.64 or 147.885/7.285. For more information, write to Russ Corkum, Jr. WA1TTV, 21 Thorndike Street, Arlington MA 02174.

PORT HURON TO MACKINAC ISLAND YACHT RACE
JUL 25–26

The Eastern Michigan ARC (K8EPV) will commemorate the 62nd Port Huron to Mackinac Island Yacht Race, July 25 and 26. The station will operate from 1400Z to 0200Z each day. Frequencies will be: 3.910, 7.235, 14.235 or 28.335 on phone and 3.710, 7.110 and 21.110 on CW. A certificate will be issued upon receipt of a large (#10) SASE, with your QSL, to K8EPV, 654 Georgia Marysville, MI 48040.

BEAVERTON OR
JUL 25–26

The Willamette Valley DX Club, Inc., of Portland, Oregon, will host the annual Northwest DX Convention on July 25–26 at the Greenwood Inn in Beaverton, Oregon. Registration information can be obtained by writing to the Willamette Valley DX Club, 58731 Columbia River Highway, St. Helens OR 97051.

WEST FRIENDSHIP MD
JUL 26

The Baltimore Radio Amateur Television Society will hold the Maryland Hamfest and Computer Fest on July 26, beginning at 6 a.m., at the Howard County Fairgrounds, Rte. 144 and Rte. 32, adjacent to I-70 in West Friendship, Maryland. Admission is $4. Indoor tables are $20 each along the wall with access to ac power or $10 each in the center of the floor. (Tables must be reserved in advance.) Outdoor tailgating is $5 per space. Accessible to the handicapped. Free walk-in VE exams; no reservations needed. Talk-in on 146.16/.76, 147.63/.03, or 146.52. For more information or table reservations, write to BRATS W3GXK, PO Box 5915, Baltimore MD 21208.

OKLAHOMA CITY
JUL 31–AUG 2

Central Oklahoma Radio Amateur's (CORA's) Ham Holiday and Oklahoma State ARRL Convention will convene July 31 through August 2 at Lincoln Plaza, 4445 North Lincoln Blvd., Oklahoma City. Features includ hi-tech programs and demonstrations, VE tests, the ARRL forum, and other events. The two-day flea market will be open Saturday and Sunday. Talk-in on 147.63/147.03. Pre-registration is $7.00 before July 22. Registration is $9.00 at the door. Flea market tables are $2.00 with pre-registration. For details, write CORA Ham Holiday, PO Box 850142, Yukon OK 73085-0142.

NEVER SAY DIE

from page 10

Perhaps there are some ham psychiatrists (other than Extra class, of course) who could experiment with trying to repair damaged Extra brains and attempt to return them to certifiable sanity. The usual trans-orbital leukotomy approach has, in most cases, rendered what had been a crazy ham into a CBer, which is different, but not necessarily an improvement.

In the early days of amateur radio it was just accepted by the medical fraternity that hams were that way because they'd gotten across the B+ and fried their brains. Now that 12 volts is standard in rigs, we don't get those hefty jolts which fling us across the shack any more, so the code has finally been recognized as the real culprit.

Now, for the good news: Hmmm, I'll let you know if I come across some.

HAMFEST ENHANCING HINTS

The success of a hamfest or convention rests almost entirely on the support of the local amateur community. Though this may seem to be a statement of the obvious, you'd be surprised at how many hamfest committees seem not yet to have figured this out.

I've been attending hamfests for over fifty years now, so I have a pretty good perspective on 'em. For the last 18 years I've been bringing a 2m HT with me and talking over the local repeaters during my visit and a surprising number of the people I talk with always have the same story. Yes, they've heard about the hamfest, but they're not planning on attending.

A well-promoted hamfest will suck every last local ham out of the woodwork. It'll have them coming in from a couple hundred miles around.

A hamfest is show business and should be run by hams with some show business background—not by a telephone installer for Ma Bell. Your hamfest committee is going to have to spend money to make money, so you need someone who is comfortable with planning and using hamfest-sized budgets. You need to draft a local P. T. Barnum for the job, not an accountant.

One of the reasons Dayton does so well is that they've spent years learning how to do it. There's a lot of organizing to a well-run hamfest—the technical program—the Big Name drawing card—prizes—contests and awards—exhibits—ticket sales—advertising/promotion—parking—badges—communications—food concessions—toilets—rain plans—local police liaison—housing—camping and trailers—security—and so on.

The committee has to remember that amateur radio isn't a single hobby—it's a whole bunch—so the hamfest has to have something of interest to DXers, to certificate hunters, packeteers, SSTVers, RTTYers, FM/repeaterers, UHFers, contesters, traffic handlers, and so on. Plus groups such as the ARRL, QCWA, OOTC, YLRL, and so on.

Prizes appeal to greed, a common interest of most hams. But mostly you have to convince everyone that they are going to have fun.

Exhibitors can be attracted if they think you're going to have a good solid attendance. You want to make their life as easy as possible, so your exhibit committee should send them brochures and call them. Keep your exhibit prices as reasonable as you can. Are you going to have a big flea market which will keep most of the people out of the commercial exhibit area and send your exhibitors home vowing never to get caught at your hamfest again?

More and more hamfests are coddling exhibitors, recognizing that the larger the commercial exhibit area, the more successful the hamfest. They keep exhibitors happy with coffee and doughnuts—with lunches brought to the booths—a small lounge—with extra help in setting up or taking down the booths—perhaps someone to mind the booth while the exhibitor gets around to see the other exhibits.

Advertising and promotion are the most critical keys to success. This means getting all of the free space possible in the local papers—interviews and news items on radio and local TV. In all of the hamfests I've attended I can't remember one which took advantage of my presence to get added TV coverage. I'm news—did you see the story on page 74 of the May issue of *Success!*? Many computer shows where I've been the main speaker have made sure that I've been interviewed on TV as part of the promotion of their show, but I don't recall a hamfest committee ever thinking of it.

But whether it's me, Roy Neal of NBC, Barry Goldwater, or Owen Garriott, your main speaker should be used to help bring in the local hams and, perhaps even more important, to attract youngsters who might be interested in amateur radio.

"A hamfest is show business and should be run by hams with some show business background—not by a telephone installer for Ma Bell."

I'll bet I get at least one request a week to come to some hamfest and speak. Of course, they explain, they haven't any budget for a speaker, so I'll have to pay my own way and take care of my hotel and car rental expenses. My calendar is busy enough so I keep it on a computer just to keep track. Last year I made over 50 flights to hamfests, conventions, computer shows, electronic shows, seminars, and so on. In the first four months of this year I got to Orlando (spoke), Dayton (spoke), the Las Vegas Consumer Electronic Show (exhibited), the International Tape/Disc Association conference in Hilton Head (where I chaired a seminar on DAT), the Music Business Systems conference in Los Angeles (on a DAT panel), and the National Association of Retail Music in Miami. Coming up are trips to Berlin and Milan for audio shows, Sydney for a board meeting, plus the electronic shows in Japan, Korea, Taiwan, and Hong Kong—CES in Chicago, Hamcom in Dallas, and so on. In addition to that I'm trying to publish some magazines and start a few new ones.

There goes Wayne bragging again, right? No, not at all. My calendar is just as full as the other major ham speakers, so that's what you're up against in trying to get one of us. It's easier to get to a hamfest (if I don't have a conflict) when the hamfest committee makes it clear I'll get some consideration. That means taking care of my travel expenses (and my wife's), a good hotel, a couple of dinners with your most interesting local hams—sightseeing local attractions.

If you want to get the local hams out to the hamfest you have to convince them they're going to have a ball. What kind of short contests can you organize? How about a home construction contest? How about an antenna-measuring contest? How about a fox hunt? How about a code contest with certificates for 20, 25, 30, 35, and higher speeds? Use your imagination and come up with contests. How about a fattest-ham prize? Oldest? Longest licensed? Most outrageous mobile setup? Most ridiculous hat?

The committee setting up the seminars all too often drops the ball when it comes to getting attendees to them. It takes more than a mention in the show guide. There should be posters all around the hamfest showing what events are taking place where. Announcements should be made over the public address system so people won't forget. The more you keep people running around, the more fun they'll remember having. I've had hamfests go to the trouble of getting me there to speak and then keep my talk such a secret than only a couple dozen turn up for it.

Heck, I can't go on for a whole book on the subject right now—but one is needed. There are hundreds of details—like renting commercial HTs for your communications since it's illegal to use the ham bands for a commercial enterprise—and don't give me that non-profit bunk—it's still commercial.

Hamfests are show biz and don't you forget it. As the number of hams dwindles, we need to do everything we can to get those few of us left out for hamfests—and to encourage potential ham youngsters to join our fun. ■

NK6K > PACKET

Harold Price NK6K
1121 Ford Avenue
Redondo Beach CA 90278

ON THE ROAD

This is being written in a hotel in St. Paul, Minnesota, on a rented Compaq computer. "Black Sheep Squadron" is on the tube, the remains of a Domino's Pizza is in the trash can, and the column is, as you might gather, late again. Since the Magnanimous Mr. Green's columnist stipend does not supply adequate funds for the leasing of computers, you can also correctly infer that I've got it for other reasons. A consultant's work is never done.

No paying job can keep the true Dayton Devotee away from the teeming crowds during the last week in April, however, and this year was no exception. Packet was much in evidence, as has been the case in the last few years. The local channel 22 news team even sent out a crew with "interview someone about packet" on their job sheet. I was standing in an aisle, wearing my "I'm A Packeteer" button, and they asked if I knew anything. I was still talking long after they ran out of tape.

Hank WØRLI got the Technical Achievement Award for his work on BBS message forwarding systems. There were several new packet devices and new features for old devices on display at the vendor booths. The packet forums were in two parts again this year, an intro session and an advanced session. For the first time the attendance at the advanced session was larger than that at the intro session. Both had several hundred hams present.

Unfortunately, packet has gotten big enough for some "entrepreneurs" (read sleaze artists) to try to cash in. I saw a $50 replacement for a resistor and a capacitor, for example. Moving on to the good, here's this year's review of packet related items I saw at Dayton '87, in alphabetical order.

AEA

One of the cutest things I saw for packet devices this year has little to do with packet. AEA's programmer, Steve Stuart N6IA, has come up with a lot of nice features for the AEA packet line. This year, he's added FAX receive capabilities to the PK-232. Using the RTTY decoder, giving two shades of gray (black and white), the PK-232 outputs FAX pictures to an Epson-compatible printer. Even in the noisy rf and computer-hash environment of Dayton, the FAX software sent near-perfect weather charts and other FAX data to the printer as they were picked off the air from a general-coverage receiver. I've always been interested in this sort of thing, so I'm hoping AEA takes it the next step and makes it easy to get the image into a computer for manipulation. The addition of FAX makes the AEA multimode TNC more multimode that anyone else's. This will do nothing to counter the only major complaint I've heard about the PK-232, which is that the manual is too big.

The other major announcement for AEA at Dayton this year was a high-speed rf modem (RFM-220). This was one of two commercial high-speed announcements (see also the section on GLB) this year. This is a true rf modem, a data port on one end, and a 220-MHz rf port on the other. The modem uses one-bit-per-baud "straight" FSK. The technical guys say the unit will transmit at data rates from 0 to 19,200 baud, although the initial marketing blurbs mistakenly set the limit at 9600. The RMF-220 uses an ovenized synthesizer and covers all of the 220-MHz band in 5-kHz steps. An oven is a device that keeps a circuit at a constant temperature, reducing temperature-caused frequency changes. The frequency is controllable from the front panel and also through an RS-232 port. All of the standard rf magic words are invoked by this unit, including GaAsFET front end and "multiple helical resonators." TX/RX switch time is less than 10 ms, power output is an adjustable 0–30 Watts.

Although two RFM-220 prototypes were on display, these units weren't quite ready for on-air demos. Availability is "mid-summer." The cost is in the $600 range.

GLB

GLB's big announcement this year was also an rf modem, the NETLINK 220. Two NETLINK radios were on the air and running 19.2k-baud demos to a constant crowd of interested packeteers. The GLB unit also uses straight FSK modulation, and engineers from both GLB and AEA say their units will be able to receive packets from each other. The GLB spec sheet says the bandwidth is 30 kHz. The NETLINK 220 has a crystal controlled oscillator with an oven, and has a digital afc The digital afc (automatic frequency control) tunes the receiver frequency based on the received signal. Two afc circuits are used: one quickly corrects for short-term drift; the other handles long-term drifts. The GLB spec sheet gives a TX/RX turnaround time of 3 ms. They also stress bulletproof rf design in a 3-page fact sheet. Price is $649, available in July or August.

F	List latest 10 message headers with message number.
F*	List all the message headers.
R <n>	Read a message numbered <n>.
W	Send a message. You will be asked receiver and subject. Send <CR> . <CR> or <CR> control-Z <CR> to end the message.
K <n>	Kill a message numbered <n>. A message being read by other station(s) cannot be killed. FO-12 BBS is a multi-user system. Only the originator of the message can kill messages.
H	Help.

Your TNC should be set as follows:

Protocol	It must be AX.25 version 2. WA8DED PROMs are needed for TNC-1.	
	Command	TNC-1 : V2
		TNC-2 : Ax25l2v2 ON
T1 timer	6 seconds or longer	
	Command	TNC-1 : F6
		TNC-2 : FRack 6
Max Frames	2 or 3 is suggested	
	Command	TNC-1 : O2 or O3
		TNC-2 : MAX 2 or MAX 3

Table 1. JO-12 BBS commands.

HAL

HAL announced the RPC-2000, an IBM PC plug-in card. I didn't get very much information on this one, but it has two packet ports and comes with menu-driven "user friendly" software. Contact HAL for information on availability and price.

Kantronics

Kantronics seemed to be taking a wait-and-see attitude this year, a stance no doubt brought on in part by the failure of their 2400-baud modem to set a standard or see major use. Their "Kantronics News" notes the appearance of level-three networks and high-speed modems. In both cases, the newsletter says that Kantronics will participate in the evolution with products to be announced later. The newsletter also reports a fix for the KAM which kept it from functioning as the TNC on an RLI-style BBS (they work fine for a BBS user). If you are a BBS sysop with a 2.0 version of the KAM software, contact Kantronics for an update.

Kantronics has addressed a long outstanding problem with their product line by incorporating a watchdog timer as an integral part of their recent products, the KAM and the KPC-4. This is a hardware device that keeps a malfunctioning TNC from locking the PTT line and leaving your station on the air for long periods of time. As mentioned in previous columns, if your TNC hasn't got one, add one before using it in unattended operation.

Pavillion Software

You had to look hard to find this next one. I stumbled into it at the Contesters' Forum. I was lured in by a paper written by AK1A with title that mentioned packet as a contest aid. A program called PacketCluster is being used to simultaneously connect a large number of users together for the purpose of exchanging multiplier- and DX-spotting announcements. This program runs on a Kantronics KPC-2, which allows up to 26 users to be connected to a single node (TNC). PacketCluster sup-

ports 25 concurrent users, with the 26th connection used to connect to another node of 25 users. Many nodes may be connected in this way. Spotting reports submitted by a user are sent to all other users on all nodes.

It seems to me that this could also be used by some types of emergency nets, where a small amount of data needs to go to a large number of stations with a high degree of simultaneity. The cost of this package is $59.95. Although I haven't used it and therefore can't recommend it, the idea is very intriguing and worth further scrutiny. I'd like to print a review by one of its users. The address for Pavillion software is PO Box 803, Amherst NH 03031.

Applications

I'm still looking for good packet applications to write about. The Pavillion software PacketCluster mentioned above is one example. Here's another, as described by J. Franklin Fields, Jr. KB0QJ, the president of the OPRA, the Oklahoma Packet Radio Association, Inc. OPRA is in the process of installing a statewide packet digipeater network to function in the event of civil emergencies, especially weather-related ones (as WX seems to be a prime culprit in tornado alley). Much of the funds and equipment will come from corporate donors. OPRA has placed an AT&T 3B2 2MB UNIX V based computer at the National Weather Service Forecast Office (NWSFO). This computer will provide menu-driven access to selected NWSFO information delivered from the NWSFO mainframe in near real-time. The program, written in C, is still in the development process. The nodes will be equipped with the WA8DED/W6IXU NET/ROM protocol to expedite dissemination. An option for the manual targeting of critical information to specific OK County Emergency Operating Centers (EOC) for immediate action will be included.

The total number of planned nodes is 22. However, the nodes now operational are limited to two areas: 5 nodes in eastern OK and 8 nodes in central OK. The two areas are not now linked, but the central nodes are performing beyond expectations. The incorporation of the NET/ROM protocol would greatly enhance throughput even now. This partial system is attracting much attention in Washington DC at NOAA and NWS, and in California at the NWSFO Office of the Regional Director. For more information, contact KB0QJ @ N5JTZ

Space News

Martin G3YJO, Jeff G0/K8KA, and Mac G8VLY spent three weeks in Pakistan in April setting up two experimental UoSAT ground stations—one at the Punjab University (Lahore) and the second at the Space and Upper Atmosphere Research Commission (Karachi). The stations will provide facilities for students to undertake projects associated with the two UoSAT spacecraft and will be active on the UO-11 Digital Communications Experiment using the amateur callsigns AP2PUL and AP2SUP. Several messages were passed between these two stations and stations in the U.S.

The JO-12 mailbox may have seen its first use by the general amateur community by the time you read this. The following information is from a status report from M. Fukasawa JR1FIG and Tak Okamoto JA2PKI which was received on May 6. Background information on JO-12 can be found in the August, 1986, issue of *73*.

JAMSAT announces the commencement of new operation mode of FO-12. On May 4th, new operation software was released. The new mode allows "On Demand" operation of Mode JD. In this mode, the bird is usually listening, not transmitting. It starts transmitting the mode JD PSK signal at 435.910 MHz immediately after receiving any valid AX.25 frame, including a UI (unproto) frame, through one of four uplink channels, 145.85/.87/.89/.91 MHz. Transmission continues as long as a frame is received once in a three-minute interval. The bird goes back to the listening mode when it does not hear an AX.25 frame for more than 3 minutes.

This "On Demand" operation happens while the bird is in the "ON" period, which occurs every other 2 hours. While JO-12 is in the "ON" period, you will hear 5-second short PSK burst every minute, so that you will know that the mode JD is available and can be switched on by sending some packets to the bird. You will hear nothing while it is in the 2-hour "OFF" period. This new operation mode will become the base of future FO-12 BBS service. A weekly schedule will be determined after enough power usage data for this new mode has been acquired and analyzed.

FO-12 BBS Program Development

The BBS software is running on the JAS-1 engineering model and is being tested by the JAMSAT software team. The first version of BBS program which has limited number of commands will be loaded and tested on FO-12 very soon.

Please keep in mind that this does not mean that the BBS is now available for public usage. While the software team is testing its functions, your attempt to connect to FO-12 (8J1JAS) might fail and you will receive BUSY from it. The first version of the program will have the commands shown in Table 1.

JAMSAT Notes

The callsign of FO-12 which you use to connect is 8J1JAS. The number of messages is limited to 50. If more than 50 messages are posted, older ones will be overwritten. Maximum memory available as message storage is 192K.

There will be no command to logout. Simply disconnect by using the TNC's disconnect command.

Personal mail will not be supported by the first version. Your messages can be read by anyone and you can read messages addressed to someone else.

While BBS is in operation, the digital repeater is disabled. Digipeat request packets will not be accepted by FO-12.

An increased number of users will slow its response and require a longer T1 (frack) time. The maximum acceptable length of the data portion of a packet (PACLEN) is 199. It should be set shorter.

FO-12 transmits at PACLEN=128 and MAXFRAMES=1. This information is preliminary and may be changed without notice.

I'm out of room for another month. I'll have to defer until next month a description of the 56k-baud modem prototype demonstrated by a group of Georgia hams at Dayton. It looks like things are finally on the move, modem-wise. ■

DEN-TRONICS
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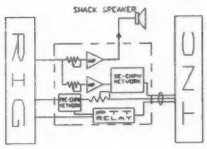

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ABOVE AND BEYOND

Peter H. Putman KT2B
3353 Fieldstone Drive
Doylestown PA 18901

NEW DIGS

As I write this month's column, we're recovering from the effects of having moved from one state to another over a 60-mile path. All of the things that usually get lost did; most of the things that can get damaged did not (fortunately). I should have suspected that a move was inevitable after spending so much time and effort to remodel my "shack" at my old QTH!

The new location offers more possibilities for VHF and UHF operation, as I now have an acre of land to deal with (as opposed to a city lot of roughly 50 x 150 feet). The township I live in has a very loose antenna and tower ordinance: Essentially, it states that (A) No antenna, dish, or tower can be situated in the front yard; (B) The tower must be set back 1-1/2 times its height from the property line; (C) It must comply with any FAA regulations where applicable; (D) No height restrictions in the general building ordinance shall apply to towers, antennas, or satellite dishes.

Not too hard to cope with! I've elected to install a Tri-Ex W51 crank-up as opposed to a fixed tower. The height fully extended is 51 feet; collapsed, it's about 20 feet. The cranking feature makes servicing antennas a whole lot simpler and adds a safety margin in high winds, a fact not lost on me after the Labor Day hurricane in 1985 did a major realignment of my old 40-foot tower and 15-foot mast. What's that, you say? Can't use hardline with crank-up towers? You're absolutely right. All of the runs on my new tower will be Belden 9913. I am so impressed with this cable that I'm doing the entire antenna array up with it, on 50 MHz, 144 MHz, 220 MHz, 432 MHz, and 1296 MHz as well (using a tower-mounted preamp with the latter to overcome the nearly 6 dB of loss on receive).

After auditing my time spent on VHF/UHF, I concluded that I did most of my contest operation portable and the requirements for operation from the new location were quite modest, so I'll be running about 100–200 Watts per band to single yagis on 6, 2 and 220, as well as a pair of yagis on 432 and an H-frame of yagis on 1296. Transverters will be the signal source on each band, driven from an ICOM IC-740 and a Kenwood TS-430S. Power amplifiers will be solid-state types from Mirage and Microwave Modules, with the exception of my trusty 3CX100 on 23 cm (they're cheap and hard to beat).

As things come along, I'll show a few photos of the new installation so you can get some ideas for your new setups (whatever they might entail). Incidentally, I elected to put all of the operating equipment in a new computer desk/hutch arrangement made from solid oak, which cost me all of $450 in unfinished form. It holds everything perfectly with the exception of the 23 cm amp, which never really fit anywhere neatly in my old shack either. The nice thing about the hutch is the open space behind the shelves for making interconnects. This ensures a neat wiring job but makes tearing the station apart for a portable contest much easier.

"The 73 Magazine/ICOM Golden Gigahertz Contest sounds intriguing and might be a good way to get a feel for 23-cm operation."

Dayton Dept.

Due to the fact that I closed on my house at 3:30 p.m. the Friday afternoon of Dayton, it should seem understandable that I could only spend one day there (Saturday) before dashing home to begin unpacking. But I did get a chance to make a few circuits around the Hamvention and saw many interesting products, to wit: The ICOM IC-575, a dual-band 10m/6m base station in the style of the IC-275 (which I was so fond of a few months back). The IC-375 for 220 was also on display, and I've made arrangements to get review units in coming months. Of course, Micro 2ATs were selling like ricecakes. Where's the Micro 3AT?

Tonna Antennas of France was there in force with every type of yagi imaginable, including new 18-element versions for 902 MHz, which I understand went very quickly. SSB Electronics of Germany was represented as well, showing the old standard LT23S for 1296 (still the best thing on the market for 23 cm to date) as well as the newer LT33S for 33 cm, which I'll also be reviewing in coming months. Kenwood has introduced a new duoband radio for 2 meters and 70 cm (TW-4100A), and these units seem to be all the rage in urban areas. Kenwood also has the counterpart to the IC-575 in the TS-670 for 40, 15, 10 and 6 meters, and offers a nice portable for 23 cm FM with the TR-50. (I was told by Kenwood that when the TR-50s hit the market in California, they couldn't keep them in stock—the orders were that good.)

Everett Gracey of RF Concepts was there with his new line of amplifiers and I must say I'm impressed with the level of workmanship. Although most of the models on display were for 2 meters, I've been told that 220 base and hand-held units are on the way. I will try to get a review of them for you shortly. Everett also showed me a blueprint for a whizbang repeater controller they will have on the market shortly (look out, ACC). Microwave Modules introduced a new 80-Watt amplifier for 220 MHz based on the popular 100HS design for 2 meters. 220 transverters were selling briskly as well.

At the Yaesu booth I was able to find out that yes, indeed, there is a FT-790R MKII in the works for 70 cm, pending type-acceptance by the FCC. Will we see a FT-390R MKII for 220? Sounds like it's a real possibility.

Advanced Receiver Research was on the scene with their line of high-performance preamplifiers and receive converters. I might add that a receive-only converter is a cheap way to check out a band before you jump in with both feet, and they are available for 50, 144, 220, and 432 MHz. When will ARR make a preamp for 23 cm? Only time will tell.

There were plenty of other exhibits that I could only pause momentarily at such as Encomm, Mirage/KLM, Cushcraft, Ten-Tec, and others. The overwhelming conclusion I came to is that there has been an explosion of new equipment and antennas for VHF and UHF operation in the past year, especially in the hand-held radio department. Hand-helds are now available for 144, 220, 440, and 1260 MHz; portable equipment is available for 50 MHz. A bewildering array of accessories confronts the hand-held user, with outboard power amplifiers, "docking" units, and antennas from every manufacturer possible.

73 and I are trying in our limited way to review as much of this material as we can. In coming issues you'll see the ICOM IC-03AT and IC-12AT, the Yaesu FT-109, FT-727, and FT-690R MKII, and the RFC 220 base/mobile and HT amplifiers. No doubt about it–it's truly a buyer's market. Shop around. Ask your friends who own some of these radios. Read the reviews, and you'll do quite nicely. And if you haven't made it to Dayton yet—what are you waiting for?

Contest Update

Bart Jahnke KB9NM writes in to tell of a scheduled portable operation for the *CQ* VHF WPX in July. Nothing unusual about that; lots of folks will be portable. What sets this operation apart is that he and 5 other operators from the well-known W1XX contest crew will be giving out contest points as 4U1UN from the United Nations Building in New York City. Not only that, they'll be on all bands—50 through 2304 MHz—to boot! Ever work a new country on 13 cm? 23 cm? Here's a good chance, especially if propagation is favorable. This operation takes place from the 18th to the 20th. Bart advises that all QSL requests should be handled through: H.A. Bohning W2MZV, 145 Troy Meadow Road, Parsippany NJ 07054.

If you missed the Spring Sprints and the ARRL June VHF QSO Party, there's still time to get on and have some fun. The *73* Magazine/ICOM Golden Gigahertz Contest sounds intriguing and might be a good way to get a feel for 23-cm operation. Of course, the *CQ* VHF WPX offers something for everyone on VHF. And right behind is the ARRL August UHF QSO Party on 220 MHz and up. Try something different—take your station out in the car, or mo-

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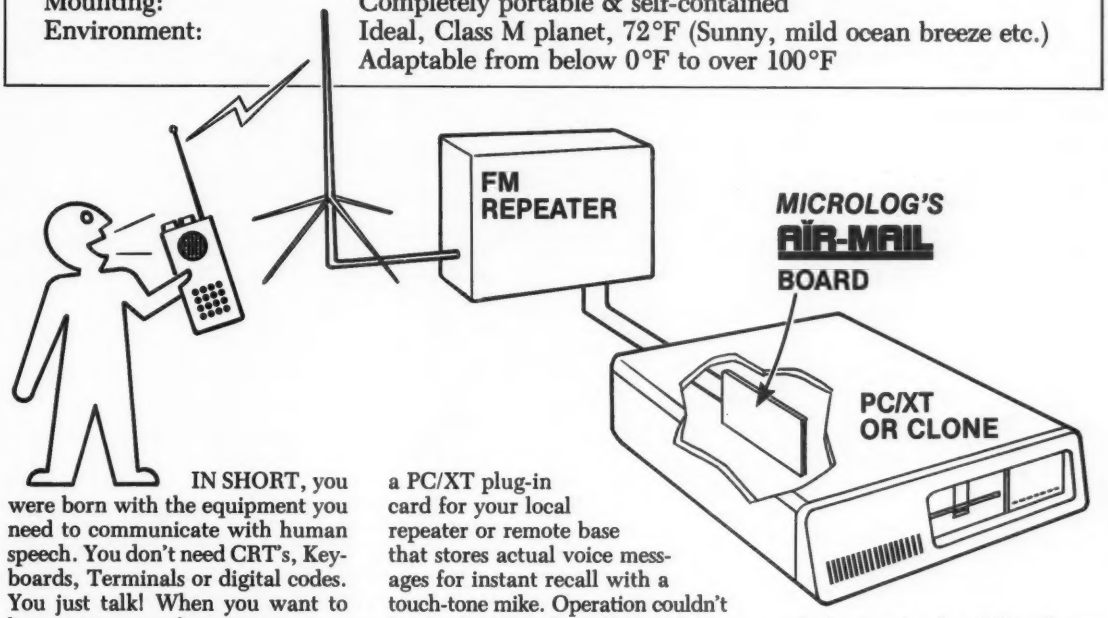

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CIRCLE 179 ON READER SERVICE CARD

bile home, or boat, or up a mountain or tall building, or wherever—there's a way to get a signal on from these places. I'd like to see photos of some unusual VHF operation from readers—something out of the ordinary. How about it?

Odds and Ends

Some folks have asked whether there is a way to prevent severe front-end overload when using a preamplifier ahead of a multimode radio (or even an FM-only transceiver, for that matter). Yes there is, provided you can access the receive line separate from the transmit line. The surplus market abounds with 50-Ohm fixed attenuators at bargain prices. I had a problem where using a GaAsFET ahead of a transverter resulted in too much signal level to the first rf stage—an MRF901 bipolar device—so the solution was to employ a 10-dB fixed attenuator after the preamp and before the transverter.

The preamp was rated at almost 20 dB of gain, so cutting it back to 10 dB resulted in a modest improvement in station sensitivity but retained good front-end performance. The GaAsFET liked driving a steady 50-Ohm load as well! The fix cost all of $3 at a flea market. Such attentuators are not rated to carry much power—typically in the milliwatt region. But they are relatively flat as far as swr goes, in many cases being acceptable up through 23 cm. They have other uses around the shack for measurements and alignment. Do yourself a favor and pick up a couple at the next flea market. Mine are made by Microlab and are rated at 100 mW maximum dissipation.

Here's another odd and end: If you have a 50-MHz radio and would like to get on 220 MHz, you can do it with the Microwave Modules MMT220-28, a new crystal, some #32 enameled wire, and a few minutes of your time. Simply replace the existing 96-MHz crystal with one cut for 85.000 MHz (Series resonant, HC/18-U holder, overtone type). Next, rewind the receive mixer coil to be 12 turns with a 2-turn link in the center. The 2-turn link goes to the 50-MHz receive output, while the 12-turn link goes to the 40822 mixer. Finally, rewind the transmit mixer coil to 12 turns with a 2-turn center link. Either side of the transmit link goes to the 40822 transmit mixers, while the 2-turn link goes to the 50-MHz transmit connection.

It's a simple matter to trim the oscillator in at the 170-MHz doubler frequency (220 − 170 = 50) and repeak the TX and RX coils. If you want, you can install a 27-Ohm, 2-Watt resistor in series with the transmit input and a 33-Ohm, 2-Watt resistor from input to ground, allowing direct drive with up to about 4 Watts. This modification has been used successfully with the ICOM IC-502 and I have tried it with a Yaesu FT-690R MKII with great results.

Pat Bunn N4LTA writes in to tell of a new 50-MHz beacon he's installed on 50.070 MHz. Output power varies from 100 mW to 10 W in three steps, changing every 15 seconds with a 3-second CW note for logging purposes. The antenna is a half-wave halo at 30 feet. Pat advises that he'll send a special N4LTA/BCN QSL card to all those who sending reports (Pat Bunn N4LTA, 171 Spring Lake Drive, Spartanburg SC 29302). See you next month, Above and Beyond. ■

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10-M	$154.09	$261.45			

Above models in stock; ask for prices on other frequencies.

DX Hidden Asset, broadbanded, gain equal to a dipole. Bi-directional horizontal or omni vertical. Designed for indoor mount; space required 0.1Λ in direction of polarization, 0.125Λ at 90° (See *73*, Feb. 1984).

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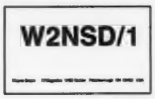

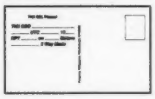

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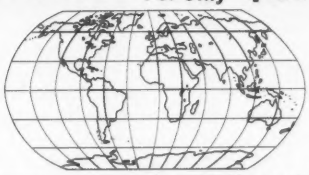

Yes, places you've never even heard of! Nearly 400 DX countries gleaned from the Awards Lists of dozens of IARU members—more countries than any other map available anywhere! ARRL's DXCC map doesn't even come close!

73 Magazine offers readers our DX Map of the World for the absurdly low price of only $5.00, shipping and handling included.

Your ham shack will be incomplete without this giant, 950-square-inch, up-to-date map. It's printed in classic black and white, permitting you to color the countries in after you've QSL'd them.

Save yourself the humiliation of never having heard of McDonald Island (what's the prefix?), Jan Mayen (prefix?) or Kure Island (prefix?).

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5 wpm–This is the beginning tape, taking you through the 26 letters, 10 numbers and necessary punctuation, complete with practice every step of the way. The ease of learning gives confidence even to the faint of heart.

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"Courageous"

20+ wpm-Congratulations! Okay, the challenge of code is what's gotten you this far, so don't quit now. Go for the Extra class license. We send the code faster than 20 per. It's like wearing lead weights on your feet when you run; you'll wonder why the examiner is sending so slowly!

Classics From 73's Library

- ***The Magic of Ham Radio***, by Jerold Swank W8HXR, begins with a brief history of amateur radio and Jerry's involvement in it. Part 2 details many of ham radio's heroic moments. Hamdon's close ties with the continent of Antarctica are the subject of Part 3. In Part 4 the strange and humorous sides of ham life get their due. And what of the future? Part 5 peers into the crystal ball. Only $4.95.

- ***The Contest Cookbook***, by Bill Zachary N6OP. One of ham radio's winningest contesters lets you in on the tips and techniques of the Big Guns. You'll learn which duping method to use, find out what equipment you'll need, and discover the secret of building a pileup. Includes separate chapters on DX and domestic contests. $5.95 while they last!

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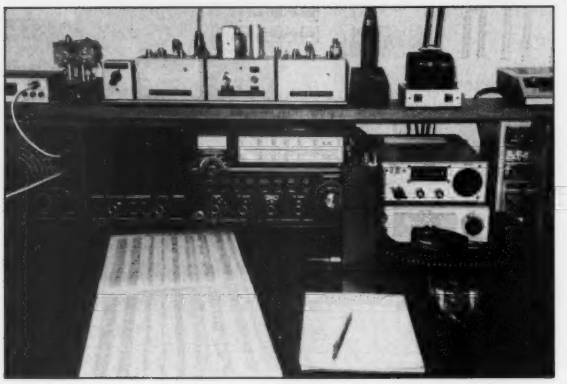

Photo A. The simple but effective WA5RON satellite station.

STATUS REPORTS

Until mid-May, when AMSAT-OSCAR 10 was returned to active service, satellite activity was slow. The unpredictable scheduling of RS5, RS7, and Fuji-OSCAR 12 did not help anyone in maintaining enthusiasm for the amateur satellite program. This month I will report on the status of our hamsats and follow up with a station review and a fish story.

Radio Satellites

Battery problems continue to plague RS5 and RS7. In spite of this, activity has been very good on both satellites. New stations in the Yukon and Alaska have been on in recent months since the last eclipse period ended in March. The RS5 transponder is excellent. The batteries, however, are completely dead, so it will only operate when the solar panels are illuminated.

RS7, on the other hand, has not only been performing well, but also seems to have some life left in its batteries. The autotransponder has even been activated for some orbits. The autotransponder, or ROBOT, is a computer capable of receiving and logging callsigns it hears on 145.836 MHz. When a callsign is transmitted to the satellite in a specific sequence, the ROBOT will acknowledge the callsign and assign it a QSO number during its response to the calling station. Later, when the proper commands are received from a ground-control station, the ROBOT will dump its list of serial-numbered callsigns. To get a QSL card, you must send for one. The address is: Central Radio Club, PO Box 88, Moscow, USSR.

To contact the ROBOT, first listen for the RS7 telemetry beacon on 29.501 MHz. If the beacon is active, try around 29.341 MHz for a few minutes. If the ROBOT is in operation, you will hear it call CQ in CW at about 18 words per minute. When it's finished, transmit a carrier on 145.835 MHz. If you do not hear a signal coming back on the ten-meter frequency, try tuning the transmit frequency to counter Doppler shift until a steady tone (the ROBOT's carrier) can be heard. When all is ready, call the ROBOT using the following sequence, with your own call inserted appropriately: RS7 DE WA5ZIB AR. The "AR" at the end must be a continuous dit-dah-dit-dah-dit, (no space between letters) otherwise the satellite will completely ignore the transmission. I have found that RS7 prefers uplinked CW at 20 words per minute, but will accept anything from 15 to 35, if it is sent well. A computer or programmable keyer will work every time; a straight key may not work at all unless you have a perfect "fist." A typical response from the satellite might look like this: WA5ZIB DE RS7 QSO NR 123 QSO NR 123 OP ROBOT TU FR QSO 73 SK.

Take care not to hog the ROBOT. Other stations may also be on frequency attempting a contact. Usually when several stations are present, it is a good practice to take turns attempting a contact. The ROBOT can be active alone or simultaneously with the satellite transponder. After a few contacts in the passband, next time listen for the ROBOT before the satellite disappears over the horizon.

The news about RS9 and RS10 has been quite confusing. At the time this column was written (early May) neither satellite had been launched. Some reports have even referred to RS11 as a hamsat soon to be launched. If only one satellite is to go up in the near future, it will likely be RS10 due to its advanced capabilities over RS9. Look to the April HAMSATS column for frequency details, and don't be surprised if the next RS calls itself RS9 even though its band plan looks like RS10.

UoSATs

The University of Surrey in England has been expanding its network of DCE (Digital Communication Experiment) ground stations for packet radio operation through UoSAT-OSCAR 11. The purpose is to demonstrate the usefulness of store-and-forward communications via low-earth-orbit satellites. A single ground station could be linked with a terrestrial packet network to allow message-forwarding to other remote areas not linked via the shortwave bands.

The DCE is not configured for casual use by any would-be operator, but the benefits will be felt by those with access to packet networks with connections to a UO-11 ground station. DCE activity can be monitored on 145.825 MHz, the two-meter telemetry downlink frequency, when a ground station is receiving messages. Although 4800 baud is in use for some 435-MHz operation, 1200 baud will be heard on the two-meter frequency.

AMSAT-OSCAR 10

After a two-month silence, AO-10 has been released for guarded operation. On May 1st, spacecraft command stations around the world concluded that the batteries needed a few more weeks to recover from the period of low illumination of the solar panels. The IHU (Internal Housekeeping Unit) was successfully reset even though the on-board memory has been heavily damaged by radiation.

As long as the batteries can continue to survive the deep discharge periods caused by uncontrollable satellite attitude, AO-10 will likely continue as a viable hamsat beyond the projected launch date of early 1988 for Phase 3C. In the meantime, we will be required to pay strict attention to operating schedules and uplink power restrictions. This will greatly prolong the life of our most ambitious amateur satellite to date.

Looking back on the attitude predictions presented in April, late June (Field Day!) and early July show a period of 100 percent solar-panel illumination. If all goes well, activity on AO-10 should be fantastic till the end of August, when we'll have to endure another hibernation period. Keep your power down and listen to the AMSAT nets for updates.

Fuji-OSCAR 12

The experiments continue on FO-12. It has been impossible to guess the satellite's schedule of operation. There were a lot of recharge days during April on mode JA, the analog transponder. In May, using a new form of JD (digital) activity, testing began on BBS (bulletin board system) software.

Previously, JD operation included a five-minute on/off cycle embedded in a two-hour on/off cycle embedded in a one-day on/off cycle. The latest change includes "on demand" operation of JD. The two-hour and one-day cycles have been retained, but the satellite only listens when it's on. It transmits on 435.910 MHz when it receives an acceptable AX.25 packet transmission on one of the four uplink channels: 145.85, 145.87, 145.89, or 145.91 MHz. While in the listening mode, a short 2-3-second burst will be sent every minute just to let you know that the satellite is active but hasn't received any packets. This will alleviate the inconvenience of the five-minute on/off cycle while still retaining an adequate charge level in the batteries, since there are no suitably equipped JD ground stations in many parts of the world. Heavy use will only occur over heavily populated areas. When no packets have been received for three minutes, the system will revert to the listening mode.

Development work on the software was conducted using the JAS-1 engineering model and per-

formed by the JAMSAT software team. The first version of the BBS had very few commands since the preliminary tests were to analyze on-board power usage during BBS activity. Enhancements will be added later.

Some TNC-2 parameters should be changed before you try to access the satellite. Set FULLDUP ON, FR 6, MAX 3 and PACLEN 128. To connect to the satellite, type "C 8J1JAS" followed by a carriage return. To get a list of available commands type "H" for help. The engineers are still experimenting, but these BBS commands might work: "R" to read a message, "F" to list the last ten message headers, "W" to write or send a message and "K" to kill a message. Obviously, knowledge of Japanese will not be a prerequisite for BBS work.

No personal mail is supported by the first versions of the BBS software. Your messages can be read by anyone and you can read messages addressed to someone else. As more users access the BBS, system response time will slow. To log out simply perform a normal disconnect. Many changes and system upgrades are expected before FO-12 is allowed to follow any long-term predictable schedule.

Ground Station Profile

For those of you that have not yet attempted any amateur satellite activity, you may be surprised to discover that your station is capable of hamsat communication or at least has most of the necessary ingredients already at hand.

I have had several RS contacts with Ron WA5RON over the last several years. His station does not include any high-cost equipment, but it works. The hundreds of RS QSOs he has made attest to the performance of his equipment. His satellite activities include chasing all mode A satellites for contacts and monitoring UoSAT telemetry and AO-10 activity when signals are good.

For satellite reception, Ron uses a Drake 2-A HF receiver as the heart of the system. An Ameco 6CB6 ten-meter preamp provides the necessary front-end gain for satellite work. His downlink antenna consists of a wire running up through a small hole in the sheetrock and down the length of the attic. A homebrew Nuvistor receive-converter can be used with the Drake for two-meter reception.

On the transmit side, Ron starts with a Santec LS-202A handie-talkie. This little-known rig did not catch on in the marketplace, but provides almost three Watts of LSB or USB output in addition to standard FM operation. A Tokyo Hy-Power two-meter amplifier connects the handie-talkie to a Lunar amplifier at the antennas. With this combination, Ron can select two-meter outputs from one-half to 40 Watts. Ron's antennas include an 11-element Cushcraft rotated only in the horizontal plane or there are various verticals he can use when the satellites are at high elevations. The Santec also provides two-meter FM reception of the UoSATs.

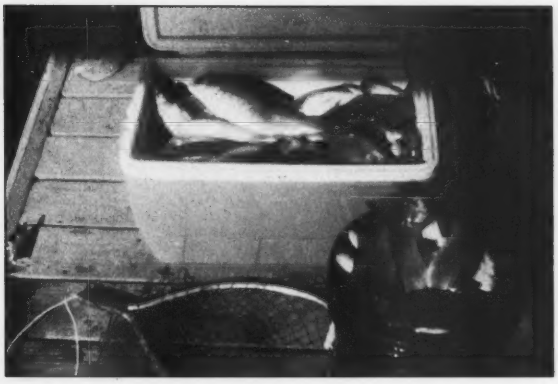

Photo B. Fishing and satellite chasing have a lot in common.

Ron tracks the satellites without a computer. Most of the time he needs simple approximations since just one antenna in the system rotates and only in one plane. Take a look around your shack. You may be on the satellites sooner than you think!

Fishing and Satellites?

While everybody else was up at Dayton hamming it up, I was out on a quiet Texas lake casting for the big one, fish that is. Just what do fishing and satellite chasing have in common? Quite a bit, from the beginner's viewpoint. I am not much of a fisherman. In fact I had only been seriously fishing once before, and that was years ago. I could have gone out by myself and caught a few, if I were lucky, but instead I went in the company of some other hams who enjoy fishing more than radio. The only handie-talkie that went out on the lake was mine.

Where do you go to find fish? When do you go? What kind of fish are you looking for and what equipment and methods work best for catching them? After you catch them, what do you do with them? The list goes on. For me there were a lot of deep mysteries involved. For my companions it was all second nature. The same is true for amateur satellites.

Where are the satellites? When do I listen? What type of satellites are up there and what equipment and procedures work best for hearing them? You can find answers to these questions by reading magazines and books, but the real payoff comes if you can talk to someone who actually operates through the satellites. To be there at his station and actually witness a satellite QSO in progress can make all the difference. Enter the AMSAT Area Coordinator.

I have mentioned AMSAT, The Radio Amateur Satellite Corporation, several times in previous columns, but have not mentioned the all-volunteer group of Area Coordinators. If you have a question about the amateur satellite program, these are the folks to ask. They are available to answer questions, help beginners, give talks at local ham gatherings, offer assistance to local educators, and arrange for AMSAT demonstrations, seminars, and discussions at conventions. There is at least one coordinator in every state. In large population centers there may be more. In Houston there are three.

If you have no idea how to find the nearest Area Coordinator, write AMSAT at PO Box 27, Washington DC 20044. You can also call during East Coast business hours at (301)-589-6062. It's up to you to make the first move. What will it be: over a hundred white bass in an easy afternoon or two catfish for a whole weekend?■

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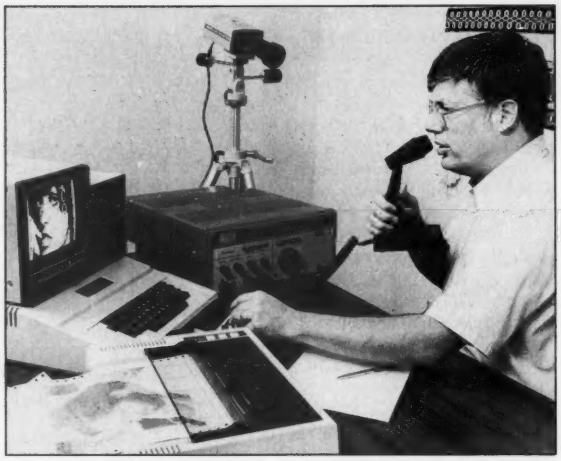

Howard Nurse W6LLO works his Apple IIe computer on SSTV.

DAYTON RECAP

The 1987 Dayton Hamvention is now history! Friday was a rainy disaster for the flea market but sunny skies prevailed on Saturday and Sunday for busy sales! An estimated 30,000 amateurs from all over the world attended the affair; if you haven't made it out there, you should go—it is a *real* experience! Let me tell you what took place as far as fast- and slow-scan TV and FAX.

We rode out with John Gebuhr WB0CMC of the Greater Omaha ATV System (G.O.A.T.S.—how's that for a name?) We stayed overnight in Indianapolis with his parents and got a chance to visit from the mobile rig with a few of the Indy ATV crowd. We saw the K9LPW ATV/R Indianapolis ATV repeater system in action, though it put out pretty poor strength pictures at a limping 2 Watts of power. The group is suffering from "self-defense" problems that hopefully will be resolved (consider one of WB0CMC's new "super hi-rejection," 15-pole, interdigital duplex filters, fellas).

P.C. Electronics unveiled and *sold out* (show stock) of their new 902–928-MHz line of AM transmitter/receivers. Tom W6ORG had built a working display unit of the TXA5–33 system and the TVC–9 downconverter housed in a weatherproof Hammond box. They showed off a newly-available, 1-Watt 70-cm "mini" transmitter unit (KPA5) for those who already have ATV downconverters and just need to add a transmitter. Tom also had his usual array of other ATV components and modules and a few Mirage D1010 amps, all which also sold out on the first day. No new ATV FM gear was available from P.C.

Don W9NTP and Sue W9XL of Wyman Research of Indiana had a booth lined up with all kinds of new goodies! Congratulations, Don, on getting that FM"on-carrier" ATV sound receiver circuit module built up and going for the WR-450 transceiver. The WR-450 now gives the average ATV amateur a choice between the standard 4.5 subcarrier sound or a direct and more powerful on-carrier FM transmitter *and receiver!* The WR-450 rig is now really two systems in one: a 420–450 tunable FM rig and a 420–450 ATV transceiver. Those of you who have worked direct FM-modulating sound systems know that for ATV on-carrier sound is superior to reduced subcarrier sending. The WR-450 transceiver features are not found in any other manufactured ATV system. It is refreshing to see an ATV manufacturer "listening" to the needs of the FSTV consumer and developing such a product! At Saturday night's USATVS workshop session, it wasn't surprising to see a large number of hands go up in the air when Bruce Brown WA9GVK/4 asked who else was using on-carrier sound techniques besides the Washington DC Metrovision ATV Group. The number of hands that were raised for ATV repeater systems that used on-carrier sound, however, was surprising!

W9NTP also had several new ATV additions to his fine line of equipment. The WR-1500 is a small 2.5-Watt (peak) "mini" transmitter with on-carrier sound for only $149.95 or with both OC and subcarrier for $159.95. It features a 10-pin connector that powers the camera, a single-plug camera input, a sync stretcher, and a metal rf-resistant cabinet. This unit, when teamed with the small DC-1 downconverter, makes for a great pair of portable or mobile send/receive units.

Don and Sue also showed off a brand new WR-FM-4912 UHF dual-band (420–450-MHz and 902–906-MHz), switchable ATV receiver unit housed in a Silvernail SE-1a-type cabinet. This receives *both* AM and FM HAM-TV transmissions!

The AM receiver outputs on channel 3 or 4 rf and the FM receiver outputs into a video monitor, with audio. The FM module, which detects the 6-MHz audio subcarrier offset, has de-emphasis circuitry, a lighted tuning meter, and an internal speaker. Price is $374.95. The Wymans also had the new WR-FM-1250 1255-MHz FM transmitter, which has a 5–10-Watt output and uses a 4-MHz crystal-controlled deviation and 6-MHz audio subcarrier. The WR-FM-4912 FM ATV receiver is also available. It tunes 1215–1325 MHz and has the 6-MHz FM audio subcarrier, switchable de-emphasis, GaAsFET front end, and other goodies. For product technical description and picture brochures, write and send SASE to the Wymans at RR#1, Box 95, Waldron IN 46182.

John Beanland of Spectrum International had good sales on Saturday and Sunday. His booth displayed the DY-20 900-MHz J-Beams with 17 dB gain, which turned the heads of Tonna owners and prospective buyers. He had 28-, 48-, and 88-element J-Beams and Microwave Module products. John gave one heck of an interesting technical lecture on interdigital filtering at the USATVS Saturday-night ATV workshop session. Communication Concepts, Inc., of Ohio had nothing new to show in ATV gear, as far as I could see. Kinney Software had a booth again this year and Dick was showing off his TRS-80C CoCo and Commodore 64 wares of SSTV low-resolution products. I didn't have a chance to visit with Dick this year, so I don't know if he has anything new.

Robot Research, Inc., of San Diego had a bit better location at the Hamvention™ this year. Hundreds viewed high-resolution 1200C color SSTV pictures. Tom revealed to some persistent amateurs that they were indeed giving serious thought to marketing Robot 1200C kits with the addition of FAX receive and computer printer hard-copy printout. AEA showed off their new PK-232 6-mode interface that now includes FAX. I was a little disappointed that it didn't show the incoming FAX pictures on the TV monitor screen and was limited to printing them out only on the Epson and compatible dot-matrix printers.

The Tom O'Hara W6ORG Saturday afternoon Fast-Scan ATV forum was heavily populated! I counted about 200 or so at the meeting. Tom gave a talk on "Fast-Scan TV Basics." He introduced Gary Heston W6KVC of the former Southern California ATV Club who talked about special events that can be shown on ATV. He showed some aerial pictures of helicopters, parades, etc. He also demonstrated cordless ATV by transmitting the entire meeting on his camera-mounted KPA5 unit. Bruce Brown WA9GVK did an excellent job of explaining the pros and cons of AM vs. FM TV, a subject of hot debate among ATVers recently. He also suggested standards and equipment. His lengthy chapter in the 1987 *ARRL Handbook* is required reading for the ATV enthusiast.

This forum was followed by the Don Miller's SSTV forum meeting. Don introduced Garnet Bebemeyer WB0UNB and Jim Williams, Jr. KC5VC for an IBM PC Robot 1200C show. Samuel Mormino WA7WOD of Interface Systems of Texas was supposed to talk about his new development of a high-resolution SSTV scan converter and was to give a live demonstration, but he failed to show. Attendance at both the Friday night W0LMD/W9NTP and Saturday afternoon forum sessions were low. I counted about 35 people at the beginning of the Saturday SSTV meeting. *Slow-Scan TV is hurting, folks!*

The FAX boys got three great hours of forum time on Sunday!

Weather Satellites moderator David Latsch introduced Robert Popham of NOAA, who spoke on what would take place in the next 25 years in WEFAX. Dr. Jeff Wallach N5ITU from IBM spoke on building WEFAX stations by using computers. Dr. Grant Zehr WA9TFB gave updates on Soviet satellite monitoring techniques. Mike Mogil of NOAA spoke on weather satellite image interpretation. And Charles Pocius from Northrop spoke on VHF receivers for WEFAX. Unfortunately, again this year, no one addressed the issue of sending FAX pictures and information by amateur radio—a facet which, in my opinion, should not be ignored.

The Friday and Saturday night USATVS/*SPEC-COM* and PARC ATV workshop sessions were well attended with a registration of 84. 16 USATVS state section managers attended these sessions.

At the Friday night USATVS workshop, speakers included: WB0QCD on "The N9CAI ATV/R Super System," WB0CMC on "Omaha ATV/Weather Radar System" and "Duplex Filters for ATVers," W3SST on "Using the Big-Wheel H-Omni Antenna with Cone Shielding for Closer Spacing," N7DOH's "VCR Demo of the New Seattle WA ATV group," and K2KQX on "Simplex ATV Repeater Experimentation." Several VCR tapes were run and reception of the Dayton ATV Repeater was established.

Saturday night workshop session speakers included: WB8ELK on "Helium-filled 80,000-foot ATV Balloon Special Event Project," KB9FO on "Chicago ATV/R Update" and "HAM COPS VCR Production," Bruce Brown on "FCC Matters and Music Docket Comments," and G3BVU on "Understanding Filtering Techniques." ATV mobiles and home-brew projects were judged and prizes awarded.

If you go to Dayton next year and are interested in Fast-Scan TV operations, please plan on attending one of these workshops.■

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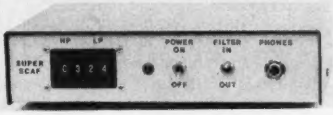

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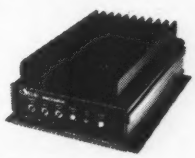

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CONTEST CONFESSION

Okay, you got me. I'm not a big contest fan. I just don't see the point in going after anything that doesn't give me either fun or money.

Call me stupid, call me crazy (and you will), but I can't find any enjoyment in spending an entire weekend yelling nonstop into a microphone or pounding a key. For what? To see my name printed at the top of a list in some ham magazine? Heck, whenever I feel an urge to see my name in print, I just write another article. Writing takes less time and pays better, too. If you want to see your name in print, but can't write, go rob a bank or take your clothes off in the local Shop 'N' Bag. Do anything but clutter-up valuable frequency space.

As you've no doubt gathered by now, I pretty much consider contesting a base form of spectrum trashing. Of course, that doesn't mean I've never participated in a contest. As a kid, I frittered away numerous hours yelling incomprehensible sweepstake exchanges and hammering out section names. But can you imagine an adult doing that sort of thing? Really!

Anyway, I hate cheating, and ham contests are loaded with some of the biggest liars and skunks I've ever encountered. Just who cross-references all of those contest logs anyway? Nobody. Who's listening to hear whether you gave the complete exchange to the other fellow? Nobody, of course.

In most contests, you can pretty much write down whatever contacts you want and win first place without turning on your rig. That way, you can spend your weekend playing ball with the grandkids, tightening the screws on your walker, or catching up on the latest issue of *Modern Maturity*.

What really bugs me is the way contest organizers have commandeered the HF bands, particularly 20 meters. There isn't a weekend remaining in the year that isn't ruined by one sort of on-air activity or another. And the behavior! Heavens! If 2 meters hasn't convinced you that ham etiquette is dead, the behavior of contesters will. And they all supposedly know the code—so much for the "keeping out the riff-raff theory."

Anyway, don't you just love the guys who use the endless-loop tapes? With the reverb? And speech compression? And distortion? Can you imagine what Hiram Percy Maxim would say if he could hear those characters? I'm sure it would inspire the Old Man to find a new application for his famous silencing equipment.

Of course, the current crop of code-based contesters aren't any better than their phone counterparts. Computers have taken all of the romance and skill out of CW competitions. What's the sense of using Morse code, an antiquated two-level encoding system, when a modern, high-level code like ASCII can do the job much better? Well, there is no sense to the situation, of course. A modern-day CW contest is really only a test of microprocessor clock speeds and brute rf energy.

"I pretty much consider contesting a base form of spectrum trashing."

And, speaking of brute rf energy, just how many contesters really pay any attention to the FCC and that silly ol' rule they have about maximum allowable power? Most, perhaps. (I'm optimistic.) But the guys running the Kalifornia Kilowatts and Galveston Gallons are wiping all of the law-abiding contesters out, so I rarely get to hear them.

Messy, messy, messy.

If the ham authorities really wanted to clean up the contest scene, they would try injecting some order into the ranks. Just as sporting events need referees or umpires, contesters require an authority force to patrol their activities. "Radio Umpires," I would call them.

These volunteer minions of the ether would scan contest frequencies—listening only—to monitor the behavior of participants. If a contester were found cheating or somehow disturbing the electronic peace, the radio umpire would have the power to either assess penalty points or to disqualify the offender from the contest. The degree of power vested in the umpires would rest in the hands of the contest organizers. Personally, however, I'd be all for giving the umps capital authority.

To prevent charges of favoritism, cronyism, or impropriety, a Radio Umpire penalty could only be imposed if the infraction were observed by at least two other umpires. (The umpires could be linked together for coordination purposes by a packet network or HF net.) With three or more umpires witnessing a clod's behavior, the hopeless miscreant would have little recourse but to accept the judgment imposed.

Good idea, right? You know, I have the time to dream up such creative thoughts because I'm not wasting my weekends contesting. Yessir.

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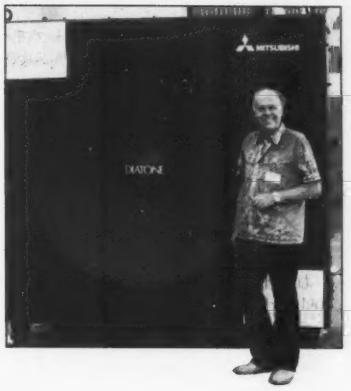

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THE TEN MOST WANTED COUNTRIES

What are the ten most wanted countries by DXers worldwide? Every year *The DX Bulletin* conducts a survey of thousands of top DXers throughout the world to determine which are the rarest countries on the amateur bands. The survey is by far the most comprehensive of its kind, and has been conducted for more than ten years, which provides some historical perspective. Let's have a look at the toughest countries to work and their prospects for legitimate amateur radio activity in the near future (see Table 1).

Note that the information in Table 1 comes from some very experienced DXers; more than 20% of those who returned the survey had worked *all the countries* on the current DXCC list! Another 5% need only Albania to have "worked them all." With only 10% of all DXCC members on the Honor Roll (within 10 countries of working all 317 current DXCC countries, the group that has worked them all is an elite group indeed.

#	Country	Prefix	% Needing
1	Albania	ZA	81
2	South Yemen	7O	75
3	Bouvet Island	3Y	74
4	Burma	XZ	72
5	Andaman Is.	VU4	72
6	Vietnam	XV	68
7	Afghanistan	YA	67
8	North Yemen	4W	65
9	Libya	5A	57
10	Laos	XW	56

Table 1. The Ten Most Wanted DXCC Countries.

"Two of the Ten Most Wanted Countries have been on the air and workable in 1987."

Albania: ZA tops the list of Most Wanted DXCC countries and has for several years. Albania is a country that is hard even to visit, much less operate from. In fact, the operation by DL7FT from Albania that provided many DXers with their only ZA QSL is viewed with as much credibility as some of Don Miller's notorious operations from Maria Teresa Reef and similar spots.

There is a club whose members try to *visit* as many countries as possible—analogous to the DXCC goal of contacting as many countries as possible. Albania heads their list of the most difficult, as well. One member, who has visited most of the 318 countries on the list, was shot at during his attempt to swim to shore in Albania! Shades of Baldur DJ6SI's attempt to operate from Spratley Island.

What are the chances of a legitimate amateur radio operator from Albania? Frankly, they have never been better! Albania has been turning more to the outside world since the death of its long-time Marxist dictator. They have recently finished a railroad into neighboring Yugoslavia, and signed a peace agreement ending their 40-year war with Greece. As the Albanian officials come to realize that amateur radio holds few threats, and offers many benefits, to their backward country, they will allow at least token operation on the ham bands, such as we see from Iraq or Taiwan. Amateur radio in China is a prime example of what can happen in Albania in the next few years.

However, don't hold your breath waiting for the next ZA contact. Nor believe every ZA rumor you hear on the bands. The first legitimate operation from Albania may well be a quick demonstration without advance warning, but it should be followed soon by more extensive operations by locals, and maybe even some DXpedition activity. Keep your fingers crossed, and hope that the Albanian officials soon come to the understanding that ham radio is good for their country.

South Yemen: Number two on the Most Wanted list is South Yemen 7O, which is among a handful of countries that has said officially and in writing that they will not permit any amateur radio activity. The country has nearly been destroyed by a prolonged civil war that has left millions dead and much of the country devastated. Foreigners are viewed with suspicion, at best, and radio gear is always considered to be spy equipment. Most of the recent confirmations of 7O contacts come from "mining" old logbooks for VS9A QSOs from years ago, QSOs that now count for 7O, if the operator is still alive years later and still has the logs and QSL cards.

Bouvet: This Antarctic island ranks third on the Most Wanted list, thanks to the difficulty of landing on the rock and ice. A DXpedition to Bouvet would be very expensive, as the recent Peter I trip ($60,000) and Heard Island trip ($50,000) showed. And there would be considerable personal risk involved. The Peter I Island DXpeditioners may have encountered the best weather in 100 years for their trip. The next group to Bouvet might not be as lucky.

However, there are no political barriers to a Bouvet trip; only monetary and time constraints. It's only a matter of time before someone gets permission from the Norwegians and arranges for the trip. This will probably be a well-publicized DXpedition. (Maybe we can convince the LA DX Group that oprganized the highly successful Peter I trip to have a hand in the Bouvet trip!)

Burma: XZ ranks fourth on the list, and is another country that prohibits all amateur radio activity. Surprisingly, however, several stations are on the air from Burma, with permission from their governments, but they are located in the north of the country, which is still under control of people whom the Rangoon government call rebels. The DXCC desk will accept Don Miller's 1965 operation, despite his propensity for stretching the truth about where he was really located, and the fact that the DXCC desk has a letter from the official Burmese government saying that there has been no legitimate amateur radio operation from the country since 1964! Consistency is not a mark of DXCC accreditation procedures. Don't expect the Burma logjam to break for many years.

Andamans: The best news in the Top Ten is that this long-sought country has been on the air in a major way since the survey was taken in mid-1986! Thanks in part to the fact that the Prime Minister of India is VU2RG, Barathi VU2RBI and other operators have twice travelled to this vacation spot off the Indian coast and put VU4APR and VU4NRO on the air for weeks at a time in early 1987. This should take care of most of the demand for Andamans for a few years. Several other groups are trying to get permission to operate from the Andamans. This one should disappear from the Most Wanted ranks for some time!

Vietnam: XV is another toughie. Since the excellent operations of the late Don Reibhoff XV4AC in the 1970s, we have been without a legitimate XV QSO. Several amateurs travel regularly to Vietnam on business, and they continue to press for resumption of radio activity, but chances are slim for now. Perhaps in a few years this one will open up.

Afghanistan: This is another one of the countries that officially prohibits amateur radio. Since the Russian invasion and occupation, YA QSOs have been nonexistent. Nor is there much hope for any change until the Russians leave. Given the strategic location of the country, that won't soon happen. Another "Don't hold your breath" country.

North Yemen: 4W has been showing signs of opening up to amateur radio in the last year, and DXers are hoping that the trend will continue. Exxon and other oil

companies are actively exploring for oil in North Yemen, and among their exploration crews are several amateurs who are working for official permission to operate in the ham bands. Some of these operators have made QSOs, especially 4W1AA, but none have obtained other than verbal permission, which doesn't cut the mustard at the DXCC desk. Prospects are good here, however; we should see valid QSOs in the relatively near future.

Libya: 5A ranks 9th on the Most Wanted list, and again, we have documented activity from Libya in 1987! Bert 5A0A has been very active on 20 CW and 15 SSB, thanks in part to a rig donated by the European DX Foundation and an antenna from the International DX Foundation. Bert has placed some restrictions on his contacts, especially asking *only* for signal reports—no questions, please—and he is adamant about "insurance" QSOs. If he has worked you before, he'll say so in no uncertain terms and ask you to give another amateur a chance at this rare QSO. His QSL manager SP6BZ (not in the 1987 *Callbook*, unfortunately) has further requested that no callsigns appear on the envelopes to him. But the restrictions are remarkably easy to live with in exchange for a valid 5A QSO. I wonder if Qadafy has any idea that Bert is working U.S. stations? I suspect that he would *not* approve!

Laos: XW rounds out the Top Ten. Laos falls into the same category as Vietnam. They are none too keen on strangers, and ham radios and spy equipment seem indistinguishable. Some time in the future this one might open up to DXpedition or local activity, but I wouldn't count on a legitimate XW operation soon.

The good news is that two of the Top Ten (Andamas and Libya) have been on the air and workable in 1987, and will undoubtedly lose that dubious distinction of being Most Wanted this summer. And two more have a reasonable chance of producing radio QSOs in the near future: Albania and Bouvet. That leaves six toughies, three of which are among the the six countries that prohibit amateur radio. Look for some shuffling in the Top Ten in 1987, but little change beyond the loss of Libya and Andamans.

The best prospects for taking their place on the list? Bangladesh S2, presently #11, will certainly move up unless someone can wrangle operating permission soon. Stations in the United Arab Emirates (#12) are presently on the air, and South Sandwich (#13) might well see activity by the end of 1987. Mount Athos is next on the list; if the Greeks, who stopped the Italians from operating there, don't mount their own DXpedition to SV/A, then maybe we should delete Greece from DXCC! Mozambique, presently #21, stands the best chance of moving up the list, as it is the next country with political prohibition of ham radio, and not mere physical or monetary restraints. Watch for the 1987 *DX Bulletin* survey for the answer!■

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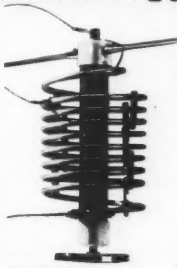

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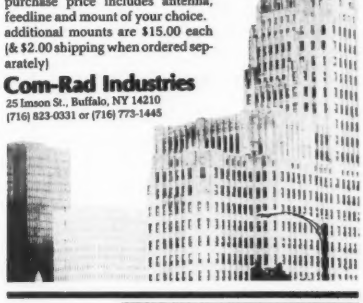

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RTTY LOOP

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Okay, CoCo fans, here comes the second barrel, so hold onto your hats, because I'm going to knock your socks off! (Sorry about all the mixed metaphors, but they sure felt good!)

Last month I presented a program for a simple implementation of RTTY on a TRS-80 Color Computer (CoCo). This month, the real blockbuster. Thanks to Dan Downard K4KWT, Technical Consultant and columnist at <*The Rainbow*> magazine, and the Delphi Information Utility, we are able to present one smashing RTTY program here in RTTY Loop.

The program itself, called RTTY1-1.BIN, is a full-featured RTTY program written for the Color Computer by Dan Cobb. Although originally written only for the older Disk Basic ROM, Version 1.0, patches are available to enable its use with the newer Disk Basic ROMs. At this time, I do not have any information about its use with the new CoCo-3.

While the program is of particular interest to disk users, tape interfacing is supported, so you don't have to have a disk, although having one certainly makes operation more convenient.

I guess that the best way to illustrate the capabilities of this program is by looking at the available command set. Here's the RTTY1-1 command set:

From Receive Mode

<CLEAR> Switches to transmit mode. This puts you in the transmit mode and turns on your transmitter. The cassette relay can be used to key the transmitter's push-to-talk line.

<SHIFT><CLEAR> Clears the screen (does not clear receive buffer).

A Auto capture buffer—This allows you to set the program to automatically open the receive buffer when it receives a certain group of characters, and close again when it receives a different group of characters. After you press "A", the program will ask you for the starting characters. Whatever you type here is what the program waits for before it opens the receive buffer. After you have entered the starting characters the program asks for the ending characters. This is what the program waits for before it closes the receive buffer. After you enter the ending characters the program is in the receive mode but the receive buffer is closed. Upon receiving the starting characters the buffer opens. Then when it receives the ending characters it closes again. To exit the "auto capture" mode, press the <BREAK> key.

B Save keyboard buffer. This lets you save the current contents of the keyboard buffer to a disk file. See "M" for entering information into the keyboard buffer. See "R" for file name specifications.

C Clear receive buffer. This clears the receive buffer and resets the receive buffer screen counter.

"This program seems to answer most of the requests the CoCo crowd have been asking."

D Disk directory. After you press "D" the program will ask for the drive number. Enter the number of the drive of which you want a directory. The program displays the directory in a two-column format. If you want to stop the directory from scrolling off the screen, press the <SPACE BAR>, then press <ENTER> to continue the directory. At the end of the directory the program will display the number of free granules left on that disk. The program also returns to the receive mode after the directory is completed.

E Enter station buffers. There are 10 station buffers numbered 0–9. After pressing "E", press the number of the station buffer you want to enter. Now you can type whatever you want to put in this station buffer. Each station buffer can contain up to 255 characters. When you are finished with this station buffer press the <BREAK> key. The program will store this buffer to disk. Each time you use the program this buffer will be the same, until you change it by entering something new in it. If you press the <CLEAR> key just before you press the <BREAK> key to save the buffer, it will force the program back to receive mode automatically when this buffer is transmitted. When transmitting a buffer that you did not press the <CLEAR> key before ending the buffer, the program stays in the transmit mode until you manually press the <CLEAR> key.

F Freeze receive buffer. This causes the receive buffer to be closed or frozen. You can still see what is being received but it is not being stored in the receive buffer. By pressing the "F" key again, you will reopen the receive.

H Displays help file. This gives you a short explanation for each command. The program pauses between each page. To continue to the next page, press <ENTER>; press <BREAK> to return to the receive mode.

K Kill disk file. By using this command you can kill any disk file. After you press "K" the program will ask you for the name of the file to be killed. After you enter this, the program will ask if you are sure you want to kill this file. You can press "Y" for yes or any other key for no (see "R" for file name specs).

L Transmit line. This function lets you type in a line (up to 255 characters) to be transmitted immediately. After you press "L", type in whatever you want transmitted. When you are finished, press the <CLEAR> key. Then whatever you typed will be transmitted.

+ Retransmit last line. This lets you retransmit the line you transmitted using the "L" command. This should be used only direcly after using the "L" command or it can produce unexpected results.

M Enter message buffer. This lets you type a message or anything else that you want to transmit. The keyboard buffer is about 6000 characters in length. When you are typing into the keyboard buffer the program will give you word wrap-around at 32 characters. While you are typing a message you can use the left arrow to correct any mistakes, but do not backspace past the line on which you are working. When you are finished, press the <CLEAR> key and then the <BREAK> key. The keyboard buffer is now ready to transmit or you can save that message to disk by using the "B" key. Every time you press the "M" key the present contents of the keyboard buffer is erased and what you type will be put at the beginning.

O Set printer parameters. After pressing "O" you can select the number of the option you want changed. The program defaults to 600 baud and 132 characters per line on the printer.

P Print receive buffer or disk file. When you press "P" the program will ask you to get the printer ready and press <ENTER>. After you have pressed <ENTER> you will be given a choice of printing the receive buffer or printing a disk file. Select whichever you want to do at that time. If you select a disk file, you will be asked to enter the file name. Add :1, :2, or :3 if the disk file is to be printed from any other disk drive than drive 0.

Q Quit and return to Basic. This exits you out of the RTTY1-1 program and cold-starts your computer.

R Save receive buffer to disk. This lets you save the current contents of the receive buffer to a disk file. After pressing "R" you will be asked for a file name. This file name can be up to 8 characters long plus a 3 character extention following a / between the file name and the extention. You can also add the drive number you want it saved to. Examples: TESTFILE/DAT or TESTFILE/DAT:1 Both save using the same file name except the first one saves to drive 0 and the second to drive 1.

S Select RTTY speed. Here you can select the RTTY speed you wish to use. After you press "S" the program will display a list of RTTY speeds you can select. Just press the number of the speed you want to use. The following speeds are available: 60 wpm Baudot, 66 wpm Baudot, 75 wpm Baudot, 100 wpm Baudot, 145 wpm Baudot, 110 baud ASCII 7 bit, 110 baud ASCII 8 bit, and 150 baud ASCII 7 bit. The program defaults to 110 baud ASCII 7 bit.

V Freeze video display. This toggles the display of RTTY being received. When you press "V" the first time it freezes the display but any RTTY received is still stored in the receive buffer. The next time you press "V" it will unfreeze the display and continue to display the RTTY being received.

From Transmit Mode

<CLEAR> Returns you to the re-

ceive mode. This returns you to the receive mode and turns your transmitter off if you have enabled the push-to-talk line via the cassette port.

<SHIFT><CLEAR> Clears the screen.

<LEFT ARROW> Sends a RTTY ID. This sends: DE YOURCALL plus a carriage return.

<SHIFT><LEFT ARROW> Sends one line of 32 RYs.

<UP ARROW> Transmit disk file. This lets you transmit any data or Basic computer program (saved in ASCII) from the disk. After you have pressed the <CLEAR> key that puts you into the transmit mode you may now press the <UP ARROW> key and the program will ask you for a file name. After you've entered the file name, extention, and drive (if other than drive 0), press <ENTER> and the program will begin to transmit the file you entered. To stop any transmission before it is completed, press the <BREAK> key then the <CLEAR> key.

<SHIFT><UP ARROW> Transmit keyboard buffer. This will transmit the current contents of the keyboard buffer. You can enter a message in the keyboard buffer using the "M" key from the receive mode. If nothing is in the keyboard buffer, the program will stay in the transmit mode and wait for you to press the <CLEAR> key again.

<DOWN ARROW> Transmit station buffer 0–9. To use this, press the <DOWN ARROW> and the screen will then change to a brighter color. Now press the number of the station buffer you want to send (0–9). After the station buffer has been transmitted, the program will stay in the transmit mode unless you added the <CLEAR> key to that buffer when you stored it to disk, or you must press your <CLEAR> key again.

Impressed? I sure was when I saw this program, which seems to answer most of the requests the CoCo crowd have been asking. Best of all is how you can get a copy of this program for your very own.

I had initially intended to run a Basic loader for the program, similar to the one run last month for the shorter CoCo program. Unfortunately, when I put such a beast together, it was over 700 lines long. I don't think I could ask my editors to publish such a monster, and I seriously doubt if any of you would have the fortitude to type it in.

Therefore, let me tell you how to get a copy. First off, if you are a subscriber to Delphi, it's easy. Log on, go to the CoCo SIG (group coco), and look at the telecommunication data base. There you will find a group of programs, uploaded by Dan Downard, which contain the full RTTY1-1, a.k.a. RTTY64, program. They are available under the heading RTTY/ASCII TERMINAL. Download them and you are set.

For those of you who don't have access to Delphi, Dan has given me permission to distribute the program to you the same way I send out other information. Send me a blank disk, return disk mailer with postage, and two dollars, and I will whip up a copy and send it off to you. On that copy will be all of the files, with a short text file to read which tells you the patches needed to adapt it to the newer DOS chips, how to insert your callsign, and any other patches, bugs, or comments received.

Once again, my sincere thanks to Dan, Delphi, and *<The Rainbow>* for sharing this with us.

I mentioned a few months ago that I have been looking at one of the new "super-box" terminal unit/modem/TNCs. Well, just to let a hint pass, it's made by AEA, and there are at least 232 reasons why I am impressed. Next month, I'll tell you the tale of this remarkable piece of equipment, which I think stands to revolutionize digital communication.

For some reason, plenty of folks are showing a renewed interest in the modes covered by this column. (Maybe it's this column?) I have looked at more than a few books being published, and will see what I have to say about those, too. Sorry about the paucity of letters lately; I wanted to get the information to you about the CoCo programs covered over the last two months, and something had to give. Next month, however, I'll pull out some of the finest received from the USPS, CompuServe (75036,2501), or Delphi (MARCWA3AJR). For now, I guess I'll just submerge myself on this hot summer's day in the ever changing, ever growing world of RTTY Loop. ■

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WEATHERSAT

Date	01 July 1987	
Spacecraft	NOAA-9	NOAA-10
Orbit Number	13128	4072
Eq. Crossing Time (UTC)	0138.86	0110.63
Longitude Asc. Node (Deg. W.)	156.85	84.03
Nodal Period (Min.)	102.0851	101.2766
Frequency (MHz)	137.62	137.5

These orbital parameters are projected two months in advance due to deadline considerations. Accumulated errors due to uncompensated orbital decay and other anomalies result in expectation of errors up to two minutes and possibly as many degrees in terms of the crossing data and possible small changes in the indicated period. Users requiring precision tracking data should rely on more current sources.

Table 1. TIROS/NOAA orbital predict data.

Dr. Ralph E. Taggart WB8DQT
602 S. Jefferson
Mason MI 48854

PHOTOGRAPHY

This month I am going to answer some of your questions about photographing weather satellite images. First, however, a plea! If you are going to write with questions or anything else where you want a reply, please enclose an SASE. This may seem elementary, but fewer than half the questions I get have that magic stamped envelope enclosed. It is hard enough to keep diligent about replies under the best of conditions, so please give me a break!

Weather satellites represent a highly visual medium, and it is not surprising that we face the problem of how to preserve the images, either for later analysis or just as a permanent record. One of the primary advantages of FAX systems is that they provide such a record as a matter of course. This is especially true of direct printing systems where the picture is immediately available without further processing.

If you are using a CRT monitor or a scan converter, however, the most effective permanent record (and indeed, the only possible record in the case of a CRT system) is to photograph the display. On the surface that is quite simple, but there are many problems that can arise. Basic photography breaks down into two possible approaches—"instant" pictures and the use of roll film.

Instant Photography

So-called "instant" photography boils down to the use of one of several varieties of Polaroid™ film and cameras. While none of the options is truly instant, results are available in anywhere from 15 seconds to a few minutes, depending upon the film/camera system employed. All share two principal disadvantages—a high cost per print and the fact that you are usually limited to a fixed-size format. If speed is all-important, however, you really have to accept these as a fact of life.

Your Polaroid black-and-white options are fairly limited. Of the many cameras the firm has produced, most of the earlier ones were designed to take either color or B/W film packs. You can often obtain a very nice used camera of this type without spending much money.

Be warned, however, that the only older models for which you can easily obtain film are those designed to take Type 106 and Type 107 film packs. Film for previous models, which often used a roll-like format, is almost impossible to obtain. This is a shame since many of these cameras had a wide range of focus and exposure options which were not available on more modestly priced later models.

Almost all the cameras using 106/107 film will require a close-up lens and considerable fiddling with a ground glass or other focusing aid to determine the combination of distance and focus, so that the image will fill as much of the film format as possible. Since all CRT and monitor photography requires close focusing and a very stable camera mounting, you would be well-advised to make some sort of a jig or mounting system to hold the camera rigidly in the proper position for the duration of your exposure.

In the case of a CRT display system, you will have to make exposures ranging from 200 to 400 seconds, during which time the camera lens must stay open. This is easily accomplished with roll film cameras that have a B (use a locking cable release) or T exposure setting, but these are typically lacking on many of the Polaroid models.

You can obtain or fabricate a system to add a locking shutter-release cable to such cameras, but you will need some way to override the automatic shutter timing. On many models this can be as simple as a piece of black tape over the electric eye, which causes the shutter to remain open until released.

Most of these cameras also require batteries of varying voltages, some of which can be hard to obtain. This should not deter you, for you can simply wire into an external battery of any size since you won't be toting the system around!

In the case of a CRT display system, proper exposure must be obtained by adjustment of the brightness and focus since the exposure time is set by the image frame period and most of the available cameras do not have an adjustable iris. If your prints are too dark, you will have to increase brightness and/or remove any CRT filters you might be using. If the prints are overexposed (very light to white), you can use fancy neutral density filters (or lenses from an old pair of sunglasses) to reduce the light reaching the camera and thus achieve proper exposure at something close to normal monitor brightness levels.

When photographing a TV monitor used with a scan converter, you can often use the built-in camera exposure control and adjust fine exposure with the "lighten/darken" controls.

All of the preceding discussion has assumed that you are using one of the idiot-proof cameras. The company does make cameras for industry and professional use that have manual exposure and iris control. If you can obtain one at an acceptable price, its operation will be more akin to roll film cameras discussed below. The same is true of larger format professional cameras that are available with Polaroid backs.

I should also note that the company has a variety of professional films, some of which will produce a negative in addition to the "instant" print. Such films are more expensive and harder to obtain for many, but at the expense of some additional handling to fix the negatives, they offer the possibility of making additional prints if a large format (typically 4 x 5) enlarger is available.

The newer line of SX-70™ cameras requires the use of color film, but presents many of the same operational problems already discussed. You will find it much

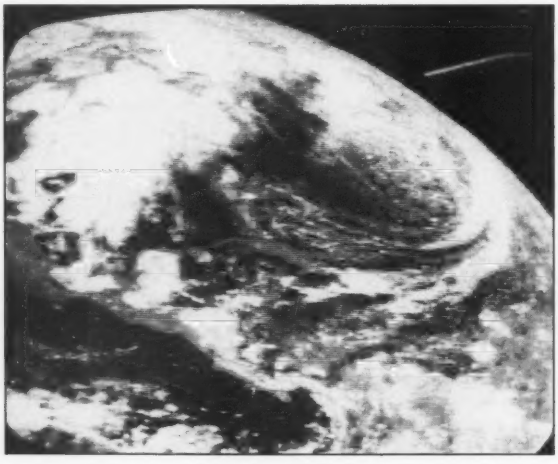

Photo A. A reasonably high quality shot using conventional B/W film. What looks like a UFO to the upper right is the only thing that mars this otherwise acceptable photo. This particular UFO is the fluorescent light fixture on the ceiling of my basement station!

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Selectivity – NFM – ±7.5kHz @ 6dB
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WFM – ±50kHz @ 6dB
±250kHz @ 60dB
AM – ±5.0kHz @ 6dB
±10kHz @ 70dB

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Scan rate – 5 channels per second
Search rate – 6 seconds per MHz
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easier to obtain accessory items such as cable releases and close-up lenses for these cameras, however, since most are fairly current. The use of color films always presents problems with color balance, a subject I will discuss below.

A final comment about Polaroid films in general. Compared to conventional B/W and color negative films, the "instant" films tend to have a noticeably narrower dynamic range. This means that they are more critical in terms of the proper exposure and also that they will have more trouble reproducing the full range from black to white on CRT or TV monitor displays.

You may find that you will have to reduce your brightness and/or contrast in order to avoid saturation at the black and/or white end of your display system dynamic range. This is a fancy way of saying that a slightly washed-out display will probably yield a better photograph with these films!

Roll Film

The use of roll films has a great deal to recommend it compared with the "instant" options. The cost per print is usually quite a bit lower, the films have a wider exposure latitude, the cameras are more flexible, and you can prepare primary or duplicate copies at any size to suit your needs. The price you pay is delay in seeing the results—ranging from an hour or so to many days, depending upon your processing options.

By far the best roll camera option is a single lens reflex 35mm that will allow you to focus and compose the picture without margin for error. Most such cameras will focus down on a standard TV monitor with no fuss, and even if you have to get really close, that can be accomplished with inexpensive lens extension tubes.

If you don't already own such a camera, a 1970s vintage Pentax™ or other model can be picked up at used camera shops for a real bargain since most serious photographers are trading up to today's "intelligent" cameras. The ability to determine exposure with a through-the-lens metering system is the only really special option you need, so there is no point getting one of the newer models unless you have some other uses for it.

Most such cameras will have only a B shutter position for long exposures, so you will need a locking cable release for photographing a CRT display. You should also use a relatively long (1/4- to 1-second) exposure when photographing a TV monitor display. This is due to the fact that such single lens reflex cameras employ a focal plane shutter that will create a mysterious diagonal line across your image if a shorter exposure is used.

You might also remember that a complete fast-scan frame takes between 1/60th (non-interlaced) and 1/30th (interlaced) of a second. If you shoot with a faster shutter speed, you will not have to worry about the shutter trace since you won't get an entire frame!

Although it should be obvious, the long exposures required for CRT monitor photography will require a fully darkened room to avoid washing out your image with ambient light. TV monitor photography doesn't require complete darkness—but the darker it is, the better will be your image contrast.

Also, keep a careful eye through the viewfinder for possible screen reflections from lights in the room! (See this month's picture for a graphic example.) You would think that these would be easily noticed, but they can be overlooked if you don't observe a darkened screen with some care!

I eventually avoided all of these problems by setting up a small monitor and a camera in a crude box with a remote shutter cable. My scan converter pumps out several hundred WEFAX pictures each day, and I never know which one might strike my fancy. With my little box, I simply reach out and snap any picture when the main station monitor suggests that it is interesting, and I don't have to pay attention to room lighting!

Film Processing

Processing your film can be your biggest headache. Without a doubt, doing the job yourself will yield the most consistent results and highest quality. Unless you are already into photography and home processing, you can expect to spend $150 to $200 to set up a very basic darkroom for 35mm black-and-white processing and printing. If you make this investment, you will give yourself complete control over the size and composition of your prints, not to mention their overall contrast and appearance.

Getting a good reproduction of what you see on the screen is not easy. Modern automatic processors with their computer controls are marvelous for the average snapshot, but are no match for what you can accomplish yourself when you know what you want! I had reached the point where I was beginning to think that I would never get any decent scan converter pictures until I broke down and reactivated my darkroom after many years.

"Don't let the photo store bamboozle you into lots of expensive equipment."

I use Kodak Plus-X™ film for all monochrome photography, as it combines fairly fine grain with good speed. Processing the film will require a 35mm film tank and the proper chemicals. I use Kodak Microdol X™ developer for all my film. I dilute the stock solution with two parts of water and process it for 12 minutes at room temperature. I skip a stop bath and simply rinse at the end of development since Microdol is a relatively slow developer. For fixing, I use Kodak Kodafix™ since it will do the job in about two minutes and has good storage characteristics.

Making prints will require an enlarger, chemicals, and paper. I process all enlargements in Kodak Dektol™ and fix with the same fixer I use for films, but diluted as per the instructions for prints. I use Kodak Kodabrome RC™ paper for all my prints since it also works out best for my photographic FAX recorder. Try to choose a resin-coated paper (that's what the RC means) since it will wash in a few minutes and can be dried on a paper towel after blotting.

Get yourself a good book on darkroom techniques, but don't let the photo store bamboozle you into lots of expensive equipment. Hardware store plastic trays work fine instead of expensive darkroom trays, and a cheap 7-1/2-Watt red nightlight bulb will replace a $40 darkroom safelight! My darkroom operations have always been low budget, and the only inferior photos I have ever used have been commercially processed!

Of course, not everyone will carry their satellite interests as far as setting up a darkroom. If you want only an occasional picture, it is more cost-effective to use commercial processing, but here you will run into a problem. These days, while one-hour processing of color prints is common and overnight processing is the rule, it can take you well over a week to get a roll of black-and-white film processed, and in most cases you are not likely to be thrilled by the results! The job is also likely to cost as much (if not more) than an equivalent roll of color prints!

The problem is that few people shoot B/W film these days, and even the larger photo-finishing establishments will set up for such film only every week or so. You can take your business to a custom finisher if one is available locally, but that will be expensive! One solution is to shoot your display with color film and take advantage of the fast turnaround. The problem you will encounter here is that of color balance, alluded to in the discussion of SX-70 films.

Shooting in color is rarely useful with CRT monitors since the phosphors used to get long persistence (P7 typically) will yield unpleasant colors with color film. Even shooting from a B/W monitor when using a scan converter will yield surprising results—with either print or slide film the image is likely to be in tones of blue! The films do not react to color the way the eye does, and virtually all of them will be far enough out of color balance to be annoying.

With a little luck and perseverance, you can correct the color to a large extent using a very light yellow filter (yellow will block blue while passing red and green), but it will be difficult to find a filter of just the right density to do a perfect correction job. You are in luck, however, for there is a new B/W film, which should become more widely available, that will solve the problem of both CRT and TV monitor photography. The film, type XP-1, is manufactured by Ilford, and the one I have tried is XP1 400, a 400 ASA, fine-grain film that is quite fast (equivalent to Kodak Tri-X).

The thing that makes this film unusual is that it is processed using *color* chemistry! Like color films, it uses dyes rather than silver and can be handled by most

processors with the same speed and convenience as conventional color print films. The print from the negatives can also be done in your own darkroom on standard B/W papers should you want copies or enlargements. My wife and kids think that a color black-and-white film is ridiculous and they are probably right! It does solve a problem, however, and you may wish to give it a try.

Alternatives

Although photography is one of the most popular ways to document pictures, there are other ways. In an earlier column I mentioned video printers. None of these is yet up to the standards of a good photograph, but they are convenient. You may wish to keep an eye on that technology for future developments. In the meantime, I am working on a project specifically for scan converters that will blow the socks off any video printer. If I get off my duff and finish it, I will make it the subject of a future *73* article!

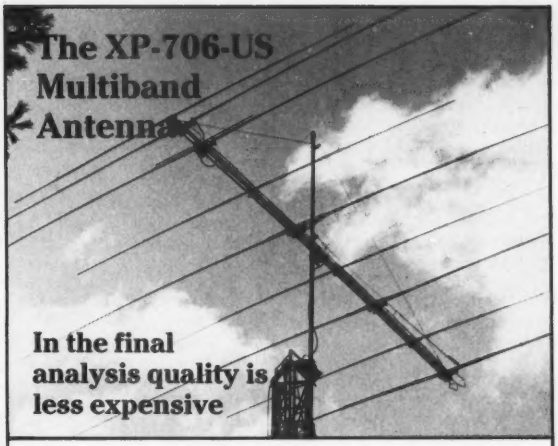
Picture of the Month

This little item is a reasonably high quality shot using conventional B/W film of a NE quad from GOES E as displayed on the *WSH* scan converter with 256 x 256 resolution and 16 grayscale steps. There is a major storm system covering the eastern U.S. which we in Michigan considered normal winter weather but which the folks on the East Coast thought was the end of the world! Guess it all depends what you are used to!

What mars this otherwise acceptable photo is what looks like a UFO track in space beyond the limb of the earth to the upper right. This particular UFO is the fluorescent light fixture on the ceiling of my basement station! Some days you just can't win! Now you can see why I use a dedicated monitor and camera in a box. Basically it saves me from being embarrassed by the obvious!

Note

References to the *WSH* refer to the third edition of the *Weather Satellite Handbook*, available from yours truly at the address at the beginning of this column for $12.50 plus $1 shipping and handling in the U.S. and $2 elsewhere. ■



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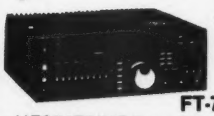

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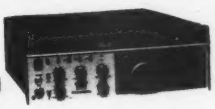

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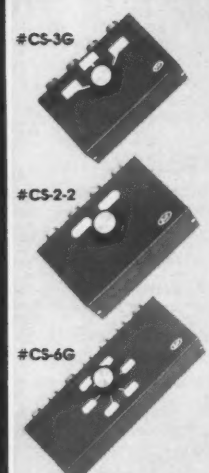

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INDECENT INNUENDO

Obscenity, even by innuendo, will no longer be accepted on any of the airwaves, including the amateur radio bands. This is the result of several FCC actions announced on April 16 and aimed directly at removing all offensive language from broadcast radio, broadcast television, and even personal radio communications.

In a major press conference that day, the FCC announced that it was expanding its definition of what it considered to be "obscene, indecent, or profane language" and issued what it termed a "new standard of decency" for broadcasters to follow. Under the new policy, television and radio stations will have to be far more careful of the content of the material they air to be sure it does not contain "indecent innuendo" of the type now popular on some drive-time radio programs. The commission stated that it is returning to its older generic definition of what consitutes indecency: "language or material that depicts or describes, in terms patently offensive as measured by contemporary community standards for the broadcast medium, sexual or excretory activities or organs."

Since a 1978 Supreme Court ruling in their favor, the FCC has used a far narrower interpretation of what it has the right to deem as obscene, based upon what are called "the seven dirty words that you are not supposed to say on the radio or TV." This standard came about as the result of New York City Pacifica Broadcasting station WBAI having aired a George Carlin comedy routine of the same name in the early 1970s and having been cited for doing so by the FCC. The matter wound up in the Supreme Court, with the government winning the case.

At their April 16 press conference, the commission also warned broadcasters that it is no longer safe for them to assume that no children are viewing their programming after 10 p.m., and now say that indecent material, of any type, is banned from being aired at any time when there is "reasonable risk" that there may be any children in the viewing audience! The FCC notes that a safe time period may exist, but that it definitely does vary from city to city and that broadcasters must adjust their programming schedules accordingly.

The FCC decision to expand its definition of obscenity appears to have come from a myriad of public complaints to the commission. In recent years, the FCC has been receiving in excess of 20,000 letters of complaint annually dealing with the broadcast of offensive material. While no broadcaster to date has violated the current rule, some have been attempting to circumvent it and advance their station ratings by using a programming format called "shock-talk," which at times uses indecent innuendo in its broadcast material.

While the FCC has not outlawed shock-talk, it has made it clear by several actions that indecent innuendo is not to be tolerated. The commission also voted to send warning letters to Infinity Broadcasting's WYSP-FM in Philadelphia, Pacifica Foundation KPFK-FM in Los Angeles, and student-run station KCSB-FM at the University of California in Santa Barbara, dealing with what the FCC views as various pieces of offensive material aired by the three.

" The FCC is applying the same obscenity standard to the private radio sector that it applies to the broadcast industry."

So what does all this have to do with ham radio? The commission is also applying the same standard in the private radio sector. On April 12, it took an action that may eventually impact on every private radio user including amateur radio, CB, land mobile, and perhaps even radio-relayed telephone. The commissioners decided to overturn a 1983 review board action that had reinstated the revoked amateur license of David Hilderbrand N6BHU of Hollywood, California.

Hilderbrand's license had been ordered revoked after an FCC administrative law judge had ruled that N6BHU had violated the FCC prohibitions on the use of indecent language over the air as outlined in 97.119. The finding involved transmissions alleged to have been made by Hilderbrand over a Los Angeles 2-meter repeater. It was based upon the same anti-obscenity guidelines that were being used to judge broadcast cases (Pacifica vs. FCC). However, the review board reinstated Hilderbrand's ham ticket after it ruled that regulations governing indecent language in the broadcast industry were not applicable to two-way personal radio.

The FCC's Private Radio Bureau did appeal the findings to the full commission, but the review board action had angered many in the ham community, including former U.S. Senator Barry M. Goldwater K7UGA. Also quite upset were the top-brass of the ARRL.

Goldwater made known his feelings almost immediately. He called members of the FCC before his Senate communications subcommittee and questioned them on what they specifically intended to do in regard to this review board decision. Goldwater reportedly made it clear to former FCC Chairman Mark Fowler that the decision was not in the best interest of the U.S. amateur service. Goldwater never mentioned Hilderbrand by name, but at that time only one such decision involving amateur radio had been handed down, the one involving David Hilderbrand N6BHU.

On March 3, 1983, the ARRL entered into the Hilderbrand case. It filed a 15-page "Motion of Intervenor" before the commission. The ARRL was not as concerned with getting a final revocation of N6BHU's license as it was with clarifying that both the findings in the Pacifica Broadcasting Case (explained earlier as the seven dirty words) under 18 U.S.C. 1464 and FCC regulation 97.119 (which deals with transmitting indecent language on the ham bands) were in agreement and constitutionally correct. The League based its motion on the premise that "an intolerable and unlawful precedent had been set by the review board." And, that's where the matter stood for over four years.

Then, on Thursday, April 16, 1987, the Associated Press reported that the FCC was also reasserting its authority to regulate indecent broadcasts in the private sector and noted that the commission was "warning amateur broadcaster David Hilderbrand of Hollywood, California, about repeated use of offensive language on the air." Subsequent information supplied by ARRL and FCC sources said that the commissioners acted on April 12 to reverse the 1983 review board finding that had reinstated Hilderbrand's amateur license. In doing so, the commission noted that the interpretation taken in 1983 by the review board was incorrect. That is, that standards applied in broadcasting were also applicable to private two-way radio conversations over the air, including amateur radio.

Hilderbrand's license was not pulled, but this now becomes a landmark decision in private radio because it both gives the FCC power to remove any violator of Rule 97.119 from the air and it sets definite standards that must be observed by all sectors of the public when knowingly or even unknowingly using two-way radio as a part of a communication. As an example, if the commission decides to apply and/or enforce the new interpretation across the board, users of profanity on CB or possibly on cellular telephones could conceivably face a penalty. Just how far the FCC intends to go in its enforcement of the new and broader anti-obscenity regulatory interpretation is unknown.

For his part, back in 1983 Hilderbrand maintained the correctness of the review board decision that reinstated his license. At that time, he told *Westlink Report* that if the commissioners were ever to rule against him that he was prepared to take the matter into the federal court system, and even to the Supreme Court if necessary. It took almost four and a half years for the commissioners to decide that their review board decision was incorrect, and they have held Hilderbrand responsible for his earlier actions.

But, there's another twist. While the commissioners reversed the review board's 1983 decision that reinstated Hilderbrand's license, they have no plans to revoke it or to impose any

other penalty on N6BHU. Given as a reason is that there may be a legal question dealing with the statute of limitations in proceeding with a penalty imposition, as to whether or not license revocation might be too harsh a penalty at this late date in the case.

In essence, the Associated Press story noted previously is correct, and the commission in this case is merely symbolic. It's a warning to others not to be caught using what the FCC views as profanity or obscenity on the public airwaves, even in a private conversation. You risk your license and more if you do.

Only In California?

I know you may find this next story hard to believe, but as you read it I suggest that you think "southern California." Think about some of the well-documented stories of the not-so-distant past—tales of the jamming of amateur repeaters, simplex channels, and even high-frequency DX. Malicious interference that always seems to get traced to a ham somewhere in the southern tier of California. The list of ex-hams found guilty of this offense grows longer every year, and by now you would think that everyone who has any access to a ham rig would know that the days of even "fun jamming"—if there is such an activity—are over. Since the early 1980s, it's been "get caught jamming and your ticket goes away." But every couple of months a story breaks that seems to link a licensed amateur radio operator to this kind of illegal activity.

And so it was that on Sunday, April 12, I stepped off an Eastern Boeing 727-200 jet to find out that another "bust" had taken place while I was away videotaping a ham convention in Kansas City. This time it wasn't a ham jamming another ham. Nor was it your usual "ham jams net" incident. No, this time it was a ham that the government says has taken on the FBI. Here's the story as it stands in late April.

"If it's possible to catch an alleged jammer of the FBI's radio system in 10 days, why does it usually take years to get the FCC to clean the rats from our radio systems and our bands?"

A San Diego, California, ham is at the moment free on $150,000 bail following his arrest for allegedly jamming the two-way radio system of that city's FBI office. Extra-class licensee Jerry Edward Gastil K6DYD was arrested in his vehicle at about 6:15 p.m. by FBI agents on Friday, April 10. His arrest culminated a week-long investigation and surveillance by FBI agents and FCC engineers. According to FBI Special Agent James Bolenbach, the interference started on April 1 and continued each weekday through April 10.

The interference took the form of music and other sounds. Bolenbach told *Westlink Report* writer Mike Sullivan WA6HJJ, "The interference would start up at the most inopportune time. Just when we had heavy traffic or a bank robbery situation or something where we need it [the radio system], here would come this powerful signal, enough to drown out and prevent our cars from communicating with each other or with headquarters."

Gastil is charged with a two-count complaint filed in U.S. District Court. One count alleges his interfering with a government communications system, which is a felony carrying a possible maximum penalty of up to 10 years imprisonment and/or a $250,000 fine. A second complaint is a misdemeanor charge of operating on a radio frequency without a license. In addition, Gastil's vehicle and the radio equipment inside it were seized at the time of his arrest and could ultimately be forfeited to the government.

According to a report in the *San Diego Union* newspaper, the FBI filed an affidavit with the complaint in which the agency asserted "that Gastil caused music and other sounds to be transmitted on the FBI frequency, interfering with regular FBI transmissions." The affidavit continues by saying that the signals allegedly produced by Gastil were monitored by an FBI electronics technician and those of the FCC. An analysis by the FCC indicated the transmissions were of a type that would originate from a mobile unit, and that the ability to transmit the interference would involve considerable knowledge of radio communications. Gastil is employed as a radio electronics technician by an Escondido firm, as well as being a licensed Extra-class ham.

The FBI says that on Wednesday, April 8, Gastil was observed as he drove to the top of a hill in San Diego. In the same surveillance, a radio direction finder was used. As Gastil drove down the hill, interfering transmissions were received and the radio direction finder operator found that the signals were being transmitted in a manner consistent with the movements of Gastil's vehicle.

Thus far, authorities say they have no motive for Gastil's alleged actions. He was scheduled for a preliminary hearing in federal court on April 24.

And that leaves this reporter with a big question. If it's possible to catch an alleged jammer of the FBI's radio system in 10 days, why does it usually take years to get the FCC off its duff to clean the rats from our radio systems and our bands? I guess the fact that we pay the salaries of all federal employees through our taxes has little meaning anymore. Obviously, we hams just don't count. A rather sobering item to dwell on from those of us who write the late shift in the City of Angels. ■

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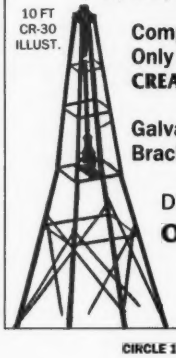

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NOVICES AND QRP

Let's dig down into the mailbag this month. I have to get some loose ends tied up and while I'm at it, unravel some at the same time.

One of the most asked questions in the last few months was: "What about us Novices?" Second place went to: "How about a look at what is out there for us in the way of equipment." I'll try to do my best on both questions.

Good grief, do I ever remember my Novice days. Scared stiff just to make a CW contact with someone in another state was bad enough. To try and QSO someone running less power than a CB, you'd have to be crazy. Well, as the song goes, "Still crazy after all these years."

Operation

Having one oar out of the water sure helps when you're running low power in the Novice bands. First things first. As a Novice, get in your log a good number of contacts. How many is a good number? Well, you should be over your key fright, be able to send CW reasonably well, and have a good relaxed feeling in front of the radio. When you can truthfully do all the above, you're ready to try QRP. Perhaps that may sound a bit rash, and I guess it is, but you have to get your basic operating techniques down before you try something different.

QRP operation can be found in the Novice bands at or on the following frequencies: 3.710, 7.110, 21.100, and 28.110 MHz. I have found that operating on 40 meters during the daylight hours will produce a contact easier than most other times.

Don't jump right into low-power operation within the Novice bands. Get your feet wet first. If you're running a commercial radio, reduce the power to 75% of full output. Keep the drive at that level for a month or two. Reduce drive again to 50%. Run the power output at this level only for two weeks. Again, reduce power to only 20%, or about 20 Watts of rf output. Leave the power at that level for one month. After that time is up, take a deep breath and turn the drive control down so no more than 5 Watts output appears on the wattmeter. (Now would be a good time to build that swr meter from a few issues ago.) Congratulations, you've entered the world of QRP.

From an operating point of view, 40 meters will only be good for Novice use during the daylight and early night times. The foreign broadcast stations will eat you alive on that band. After dark, switch over to 80 meters. When the sunspots get their act together, 15 and 10 meters should show promise during the day and evening hours.

Calling CQ will now prove to be much less successful than at the 100-Watt level. When the bands are quiet, CQs may turn up a contact, but don't bet a lot of money on that happening. The technique of "tail-ending" may help the Novice. While tuning the band, listen for two stations that are in QSO. When the stations sign with each other, call the loudest one. The operator on the other end will probably still be listening on frequency and will hear you call him.

Try to run the radio selectivity at the widest position that is available. The reason for this is to allow you to hear other stations that may be off frequency, yet are calling you. After contact has been made, close up the selectivity.

After a few weeks of working QRP in the Novice bands, you can pass the General code test with flying colors. In fact, you could very well do just great in a QRM-coping contest as well.

I sure hope this information is helpful. Quite a few hams got their start by running low power. The gear is less expensive in many cases.

"With all fairness toward Heath, the HW-7 had a receiver that sucked canal water."

Equipment

Running low power does not mean running inferior equipment. Like many other hams, I build a lot of my own gear. I do, however, like the commercial equipment also. Let's take a look at what is available for the QRP operator.

I'll first look at the Heathkit series of low-power radios: the HW-7, HW-8, and HW-9. If you're into QRP, at some time you'll operate one of these radios. The first model introduced was the HW-7. Between the years 1972 and 1975, it sold about 10,000 units. With all fairness toward Heath, the HW-7 had a receiver that sucked canal water. Many a modification was printed to fix what Heath did not. Some of the modifications were only slight circuit changes. Others used a completely new receiver front end.

Aside from the receiver troubles, the HW-7 worked quite well. It had a power output of about 2–3 Watts. You could use crystal control for the transmitter as well as the built-in vfo. The receiver used the direct-conversion scheme.

The HW-7, unmodified, will not hold its own on today's bands. If you want one for your QRP collection, that's fine. Plan to pay between 30–80 bucks. That upper end would be for a perfect condition HW-7. Supply and demand will raise or lower the price.

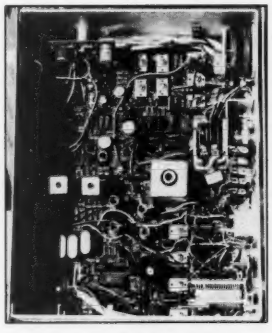

Photo B. Inside the HW-8. It has one board and is a builder's delight. I lied a bit, there is a smaller audio board mounted on the top left.

The HW-8 was introduced in 1975. Heath fixed the receiver bugs that were in the HW-7. However, the cries of the QRP operators fell on deaf ears; they again used a direct-conversion receiver, although it was a great improvement over the HW-7's receiver. Power was boosted a bit to 3–4 Watts output. The radio covered the 80–15 meters.

Heath sold over 15,000 units before dropping the line in late 1984. The HW-8 has become the "Chevy" of low-power operation. The radios are still in demand on the used market. Plan to pay $60–$100 for a used one, depending on condition and accessories.

The HW-8 is going to be a tough

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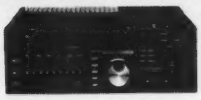

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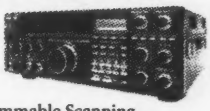

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act to follow. But Heath Company is attempting just that with the HW-9, the third generation of Heath's QRP CW-only transceivers. I'm asked time and time again, "Which one is the best, the HW-8 or the HW-9?" Both have their place and their troubles.

The HW-9 comes in kit form. It is not an easy kit to put together. There are a lot of circuits that fit in a very small box. If you are new to kit building, get your feet wet with something else a bit easier to assemble. Then move on to the HW-9.

The HW-9 is essentially a stripped-down version of Heath's Model 5400 transceiver, incorporating some of the 5400's best features, minus the high-power module. The HW-9 is shoehorned into the same size case as the HW-8. The color has been changed from the classic Heath green to the darker color of brown which Heath now sports on their equipment. The innards feature two PCBs instead of one, as in the HW-8. Broadband tuning of the receiver and transmitter has done away with the preselector and push-buttons of the HW-8.

FINALLY, Heath listened. The HW-9 has a single-conversion receiver with a 9-MHz i-f and a four-pole crystal filter. Read that over again. The HW-9 has a superhet receiver instead of the often-cursed direct-conversion receiver. Top things off with RIT, a better audio filter, 5 Watts output (3 on 10 meters), and full QSK (break-in keying).

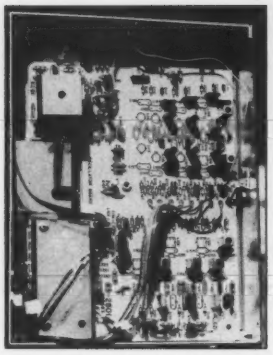

Photo C. Inside the HW-9. Notice how much more complex the inside of the HW-9 is. This is the top view.

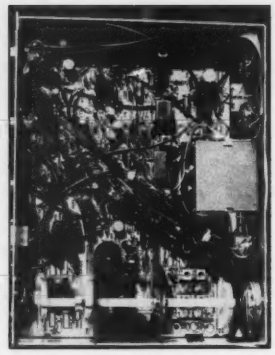

Photo D. Bottom view of the HW-9.

The basic radio comes with 80, 40, 20, and 15 meters. You can add 30, 17, 12, and 10 meters with an optional band package. All the bands are front-panel-switched.

The HW-9, like the others, is a CW-only radio. The HW-9, with its superhet receiver, tunes upper sideband. You can't listen to SSB on 75 or 40 meters. You are on the wrong sideband for those bands.

You can, however, listen to phone on 20 through 10 meters. Heath sells the HW-9 for $250, but I have seen the radio on sale from Heath from time to time for as little as $199. That price is for the basic unit; add some more green for the band kit and optional power supply.

I have no idea how well the HW-9 is selling. It does seem to fill the void of a plain vanilla CW-only low-powered radio. Only time will tell if the HW-9 can fill the footsteps left by its little brother, the HW-8.

While the HW-9 is a radio for the QRP gang, Heath introduced the HW-99, which is geared toward the Novice. Band coverage is 80, 40, 15, and 10 meters. The HW-99 is an HW-9 with a power amplifier and 110-volt supply all in one box (more or less). The final transistors operate on 28 volts; therefore, the unit will not work off batteries. You can't add the WARC bands to the radio. For a deeper look at the HW-99, check out the April issue of *73*.

That's about it for this month. Next time I'll look at Ten-Tec and their line of QRP radios. Coming soon: solar/wind power, antennas, station accessories, and a whole lot more.

Send your photos to me along with your comments. Drop a line or two or three to *73* headquarters. Tell them how much you like the QRP column. From my mail bag, it's a well-read column. Thanks for all your support. ■

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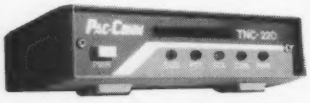

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73 INTERNATIONAL

NOTES FROM FN42

A sense of humor can be handy. We keep noticing the increasing visibility of Japanese influences all around us, but not many know that if we are planning on a trip abroad from the United States we won't get there without help from Japan. Huh, you ask? Well, you see, the State Department's new million-dollar passport-producing machine (4200 per hour) was made in Japan by the Uno Seisakusho Co., Ltd., which came out ahead of everyone else in the bidding. So, yoi goryoko o! (Have a nice trip!)

Six Independence Days in July (in addition to our own, on the 4th.) Venezuela's is on the 5th, Argentina the 9th, Bahamas the 10th, Colombia on the 20th, Liberia on the 26th, and Peru on the 28th. The 1st is Canada Day, the 4th is Philippine American Friendship Day. It is National Day in Malawi on the 6th, France's Bastille Day on the 14th, and there are two each National Holidays and Liberation Days: Iraq on the 17th and Belgium on the 21st, for the former, and Nicaragua and Poland for the second, on the 18th and 22nd, respectively.

ROUNDUP

Japan. Congratulations to Japan also for developing a personal computer using TRON - a system which will accommodate the several-thousand-character Japanese alphabet. Actually, there are three Japanese alphabets, *Hirgana, Katakana,* and *Kanji.* The first two (samples spread around this page) are phonetic but can be used for writing; the last is used for writing only, and is based on Chinese characters, of which there are more than 20,000—so many, in fact, that nobody really knows the total. A sample of these is shown below. (There also is *Romanji*, which more or less translates Japanese words into the Latin alphabet.)

守株待兎

To the left, are characters saying (literally) "Stand under trees, waiting for rabbits." This comes from the Chinese folk tale of the boy out hunting rabbits who saw one run smack into a tree. He grabbed it when still unconscious and then waited in vain under the tree for more rabbits to run into it. Work the moral out for yourself!

Great Britain. Congratulations to *Short Wave Magazine* for completing 50 years of service to the radio amateur, and best wishes for the next 50. Perhaps in the coming years, however, the editors will learn technical terms and how to spell. I mean, really! "Valve" for tube. Lisence, spelled license (or licence, or is it lisense?) Football is spelled soccer—or the other way around—or Rugby? Favor is favour, and oh, yes, they drive on the wrong side of the road.

Poland. First notice: The Ninth Symposium and Exhibition on Electromagnetic Compatibility will be held in Wroclaw, Poland, June 28-30, 1988. Papers are now being called for on any and all aspects of EM, in English or Russian; they are due July 15 this year. Details available from the editor of this column.

Argentina. The president of the Radio Club Boulogne, Marcelo F. Avila LU5EIC, is the QSL manager for L2D (contest) calls and AZ1ARU/15, which was the commemorative call for the IX plenary assembly of IARU Region II, May to October, 1986. Address: C.C. 39, 1609 Boulogne Sur Mer, Buenos Aires, Argentina.

Greece. Listen for SY1UA in mid-June, writes Associate Professor Lukas H. Margaritis SV1ABX, for "a worldwide announcement . . . by short wave SSB two-way communication." The message will be about the 150th anniversary of the University of Athens. A special award–QSL card will be sent to all stations making contact.

Brazil. Received just in time for this issue: hot news: *Cool it!* Annual Fire Prevention Week is June 29 to July 5, and ZZ8ADV (SSB) and ZZ8VMC (CW) will be active on bands 10 to 80m. QSL manager, PW8DP, PO Box 84, Porto Velho, RO–78900, Brazil. Thanks to Ron ZZ8ADV.

Finland. Radio Finland offers North America (except Connecticut) 1–800–221–9539 as a source of recorded information and a place for you to record comments. These will be mailed to Helsinki. Your voice will NOT be used in programs. Thanks to *Radio Sweden International* Bulletin 1931.

AUSTRALIA

Jim Joyce VK3YJ
44 Wren Street
Altona 3018
Victoria
Australia

MORE VK8

Why another article on VK8? The article in the May issue was about Alice Springs which is in the crocs last March, one in full view of a busload of American tourists. A cartoon in a local paper shows a crocodile reading a newspaper headline, "Croc Attacks Boost Tourism," and saying to a companion, *"Perhaps if we stop eating them, they'll go away."* It is a sad fact that in the last two years more people have been attacked or eaten by crocs in the northern parts of Australia than by sharks for the whole of Australia, in the last decade.

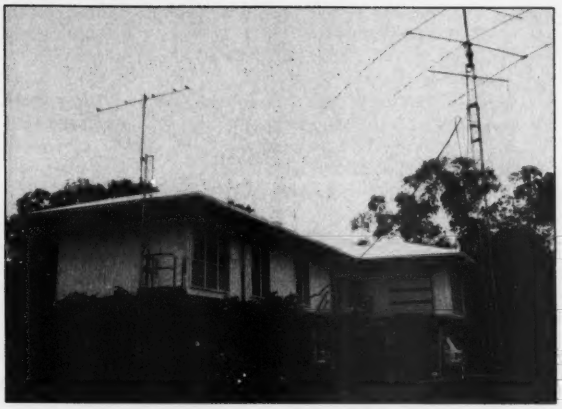
There are plans for a tourist hotel to be built in Kakadu National Park, where *Crocodile Dundee* was filmed. It will be in the shape of a crocodile, with the guests entering via the open jaws. (I wonder where the staff will have to enter?) *[For the last few months, Northern Queenslanders have been trying to solve the problem by eating the crocodiles, according to the Sydney* Morning Herald. *"They are munching their way through hundreds of crocodile steaks a week. . . one takeout outlet is selling crocodile burgers."—Ed.]*

Darwin's Pioneers. Without doubt, Darwin was our first multicultural society. Located closer to Asia than our other cities, in its earlier days it was the crossroads where East met West: Chinese gold miners, Japanese pearl fishermen, Malays, local aborigines, plus Europeans from many countries, blended together into a very mixed and at times violent society. Not so today. With a population of 65,000, Darwin is the capital of the Northern Territory (twice the size of Texas), and is a modern city with state-of-the-art complexes. Much of its up-to-date nature dates from Christmas of 1974 when Cyclone Tracy destroyed all

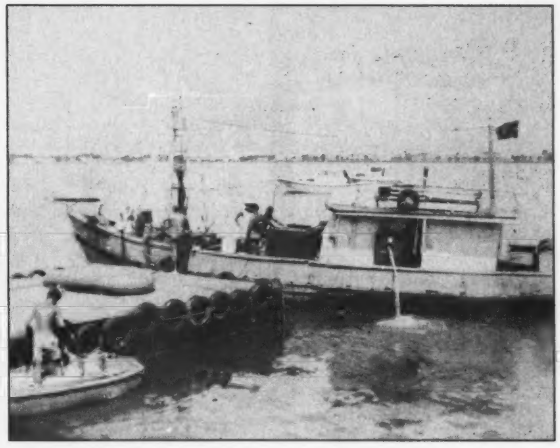
Larry Munns VK8LM, the "Money Tart."

dry, red center; the other main city in this over-half-a-million-square-mile area is Darwin, a thousand miles to the north, with a tropical climate and different lifestyle.

Crocodile Dundee Country. There have been seven people killed by crocodiles in the "Top End" over the last two years despite the signs all over the place saying **No Swimming Due To Crocodiles!** Two were taken by



VK8LM's QTH. Left: 5-element 6m yagi; 8-element 2m yagi and 3-element triband TH3JK on right. Tower has been winched down for the wet (cyclone) season.



The "First Class" liner to the Rocks.

of the old character of Darwin, along with 95% of the city.

Crisis and Amateur Radio. Amateur radio played a major role during the aftermath of the disaster, with Slim VK8JY being the first to make contact with the Southern States. He made contact with Ken VK3AH in Melbourne. Slim spent 78 hours at the mike during this time, while Ken's home in Melbourne was declared an emergency station, with police keeping reporters and the public away. Messages by these stations were, at times, relayed by the Royal Australian Air Force at Butterworth, in Malaysia, to relief aircraft. This amateur radio involvement in the Darwin disaster is a story all in itself.

Fun and Games. Amateur radio is involved in most of the sometimes-weird activities up in the Top End. For many years Darwin held the title of the largest-in-the-world per-head-consumer of beer. With excess numbers of empty tinnies, the city decided to have a beer-can regatta in Darwin Harbor every year, with the requirement that all craft had to be made out of empty beer cans.

The Darwin amateurs provide communications for this event. They also provide communications for WICEN (Wireless Institute Civil Emergency Network), JOTA, and most contests, and engage in the usual fox hunts, etc.

With only 160 amateurs of various grades licensed to operate within VK8, only 71 have full call privileges to operate on HF. Not all of these are active, of course, so you have, on average, one HF amateur for every 10,000 square miles! This does make them a rare VK contact.

VK8DA. The first meeting and formation of the (then) Darwin Radio Club was held on November 7, 1966. In those days, there were not many resident amateurs. They chiefly were public servants from other states on three-year terms of duty. Some stayed on for longer periods, and others liked what they saw so much they are still in Darwin. They were a very enthusiastic and helpful group, and their energy led to the start of the club and VK8DA, the club station, and VK8VF, the 2m beacon.

Membership in the club seems to vary between 25 and 50. Their club station should be heard worldwide due to its diverse modes and transmission frequencies (see box). There is an affiliate group, the Territory Amateurs Radio Teleprinter Society, (TARTS)—VK8TTY; "tarts" is slang for girls of loose morals, but by no stretch of the imagination do members fit this description despite the titles of the officers. Bill "Spud" Murphy VK8ZWM is "Chief Tart," Henry Anderson VK8HA is "Miss Tart," and Larry Munns VK8LM is "Money Tart." The group rebroadcasts the ANARTS weekly broadcast with local editing each Sunday evening on 3.555 and 146.600 MHz, with call-back.

VK8DA—relays VK5WI Sunday morning broadcast on 3.555 MHz (also on 146.5 MHz, courtesy of Henry VK8HA)
Club Net—3.555 and 21.150 MHz Sunday at 1000 CST (0030 UTC)
Beacons—VK8VF on 52.200 and 144.480 MHz
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Skipper Murrao.

BRAZIL

Carlos Vianne Carneiro PY1CC
Rua Afonso Pena 49, Apt.701
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ST. PETER & ST. PAUL ROCKS

If you're not a crab, a sea bird, or a Marine, and you tell me you've been landed on St. Peter & St. Paul Rocks, two things will be clear to me: You are as mad as mad can be, and you must be a radioamateur—which means exactly the same thing.

Ron PY1BVY and Paulo PY1ZT spent ten days operating from these "only-God-knows-what-for rocks," 640 miles out into the Atlantic from Recife, at 00° 56' North and 29° 21' West.

One year of planning and experience with the DXpeditions to Trindade Island (PY0T) and Fernando de Noronha Island (PY0F) brought Ron plenty of know-how, but nothing could prepare one for the tremendously inhospitable St.s Peter & Paul Rocks. They are a group of 7 or 8 savage volcanic upthrusts none higher than 20 meters (where Ron and Paulo set up), and the largest being about 75 meters long and 15 wide. No soil, no sand, not a drop of drinking water, just thousands of sharp volcanic edges making impossible even a single comfortable footstep.

Strong waves crashed against the rocks constantly, making landing an extremely difficult and unforgettable experience; a small rowboat is the only way to get inside the U-shaped stoney bay, trying to work in perfect synchronism with the 5–6-meter high waves... *Now! JUMP!* And one has only seconds to decide what to aim your feet at—if you really do intend to land on St. Peter & St. Paul!

There are plenty of crabs on the lower rocks, and two kinds of sea

The "home on the rocks" from the boat.

Ron (left) and Paulo at "home."

birds, the mumbebos and the Little Widows, and they are the Rocks' only living presences—except for bird lice all over, so plenty of repellents should be in the luggage. The two kinds of birds don't seem to exactly love each other: They live in completely separate colonies in this less-than 1,200 square meter area.

The temperature is a constant 26° C, the wind is permanently blowing, the equatorial rains come hard and sudden and leave as suddenly, there is an ardent, burning sun which is extremely dangerous if not properly considered and respected. The expeditioners' not-so-heavy canvas was simply torn away in the first strong gusts, and only a very heavy one, courtesy of the "Skipper" (Manoel Murrao) was able to last out the ten-day operation.

This was volcanic rock, so tremors were expected, but Ron and Paulo were sure frightened when at 1710 GMT on March 24, there was a shaking like that of a car crossing a light bridge. The Skipper confirmed it as an earthquake the next day; the boat crew was used to it as they always fished around the rocks.

Daily bathing consisted of pouring salt water over head and body, dipping it from tidal pools with a leather hat. This was because around the rocks lived a fish like a piranha, two spans long by one high . . . any living bait dropped in the water was torn to pieces in seconds, and Ron had touched a just-caught one and was surprised by a sharp bite to a finger tip.

It took four and a half days to get to the Rocks in the 13.5 x 4 meter fishing boat, and it then was a day and two nights before weather conditions permitted landing. This involved getting 20 packages and the equipment ashore, including the 66-kilo Mongomery generator, which was hauled along cables fastened to the boat's mast and the rocks, with seven men pulling ropes!

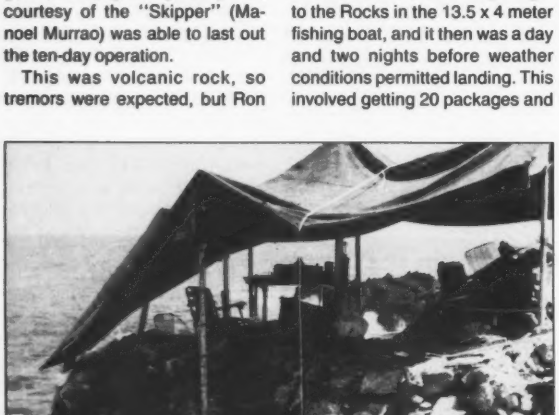
The first day was spent setting up, raising two 10/80-meter verticals tied by ropes to the rocks (digging being impossible), and setting up the equipment on telescope-leg tables. And the next morning, after the 255-foot longwire was stretched from the main high point to another only 5 meters high, the Rocks went on the air . . . ZY0SA and ZY0SB . . . CQ, CQ . . . .

The equipment was Yaesu FT-101E, FT-7B, FT-901DM, FC-901, 101B vfo, MFJ keyer, and the 1.450-Watt generator. Unfortunately, the vfo was damaged, and no split operation was possible; tremendous pileups on all bands could be only partially attended to. Total QSOs was 6,025 (see table).

There were plenty of QSY requests from Asia and Oceania, especially for 40–80 and 160 operations. The hardest pileup was at 40m, at times with six or seven QSOs per minute. On SSB, 83 countries were QSO'd, 81 in CW mode, and six continents each.

After the 171 liters of gas were used up (and also the dehydrated soups, biscuits, powdered milk and coffee, dehydrated banana marmalade, and water, resulting in a 3-kilo weight loss for each of them), the DXpedition had to end, and the task of leaving the Rocks began. After three hours of hard work all but the longwire had been recovered—and there was a sudden drastic weather change. Strong winds and high waves forced the boat away from shore, with Paulo and one member of the crew still on the Rocks. Time was so short that there were no choices—and the two waited for a high wave and dove in. All that anyone could think of during the terrifying, shocking, unforgettable time it

Bronze plaque affixed to the volcanic rock.



The "home" on the Rocks.

Band	Frequency	QSOs CW	QSOs SSB	Conditions
10	21.010/.020	92	21	Exc.
15		908	871	
20	14.015/.025	1,301	948	V. Good
40	7.002/.005	831	102	V. Good
80		354	46	
160	1.832/.834	528	23	QRN but FB
Totals		4,014	2,011	

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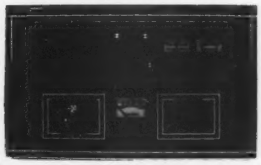

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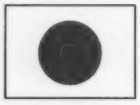
CIRCLE 26 ON READER SERVICE CARD

took for the 25–30-meter swim was the voracious piranha-like fish!

Five days later, Ron and Paulo were back in Rio, readying the QSL card Ron designed and is sure that everyone will like. Lady luck had been on the side of the DXpeditioners—a little later the Skipper called to say that he'd tried to recover the longwire, but terrible weather and fantastic waves didn't allow him even to get close to the Rocks.

The QSL Manager is PY1BVY —PO Box 1502, Niteroi, RJ, Brazil 24000.

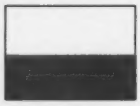


JAPAN

Japan Amateur Radio League
All Asia DX Contest
PO Box 377
Tokyo Central
Japan

The 28th All Asian DX Contest has been announced by JARL (Japan Amateur Radio League). Its purpose: to enhance the activity of radio amateurs in Asia and to establish as many contacts as possible between Asian and non-Asian stations. The contest periods are: Phone: 48 hours from 0000UTC the third Saturday in June (June 21) and CW: 48 hours from 0000UTC the fourth Saturday in August (August 22nd). Details from your radio club.

Last year, 697 stations participated of which only 38 were North American. W6RJ, NA5S, and K7SS were Continent leaders (single-op, single-band) on the 3.5, 14, and 28 MHz bands, respectively. The single-op, multiband winner: K3EST/6 for both North America and the world, and the multi-op, multiband winner: N6AW for North America. Other worldwide winners: UA9SP (3.5), UA9SHO (7), 4X8T (14), YC4FRX (21), DV1TV (28), and YE0X in the multi op, multiband category.



POLAND

Jerzy Szymczak
78–200 Bialogard
Buczka 2/3
Poland

The XVII meeting of the Polish DX Club, held last October in Mietno, near Garwolin, drew 150 members, candidates, and friends. Honored guests included Professor Dr. Eng. A. Zielinski SP5LVV, former president of PRAA, MSc. Eng. J. Rutkowski SP5JR, current president, A.K. Jeglinski SP5CM (one of the Nestors of the Polish hams), Region I, IARU officer, W. Nietyksza SP5FM, and Marcel Bargallo EA3NA. Dr. H. Cichon SP9ZD presided, and gave a report on the 60 years of DX Club activities.

The Club has 367 full members, 43 applicants, and 2,238 honorary members from 124 countries. The scores of the '86 SPDX Contest were announced (see box).

III CHAMPIONSHIP

The III Amateur's Radiolocation World Championship was held in Sarajevo, Yugoslavia, September 3–7. This event was held first under PRAA sponsorship in 1980, in Cetniewo, near Wladyslawowo; in 1984, the second was held in Oslo. (The next will be in 1988.) In 1986, 120 hams from 17 countries, including four from IARU Region III, competed.

The Polish women's team won 5th place, and individually, Sylvia Kurzawska was 7th on 144 MHz. K. Slomczynski SP5HS was chairman for the international jury which refereed.

SP0DL/AM UNDER THE SKY

On Air Force Day, SP0DL worked for five hours from an airplane, using a Kenwood TS130, Yaesu FT290R, ICOM IC402, a 42m longwire, GP on 144 MHz, and a dipole on 432 MHz. The average flight altitude was 2,000 meters. With SP6ASD, SP6GWN, and SP3DFR operating, there were 400 QSOs on 20m, 350 on 2m and 0.7m, and a few experimentals on 20m and 10m. The first operation of this kind was on October 12, 1985, when the hams of Zielona Gora and SP3KJB/AM on board a four-seater aeroplane experimented with the effects on communications of engine and weather interferences.

Top Winners 1986 SPDX Contest

Individual stations:	SP3IBS, 231796 BY
Club stations:	SP2PDI, 250560 BY
1.8 MHz band:	SP5INQ, 3780 SE
3.5 MHz band:	SP3GEM, 38979 KL
7 MHz band:	SP9CTT, 10906 KA
14 MHz band:	SPNUT [?] 38820 KL
21 MHz band:	SP9CSO, 2204 BB
28 MHz band:	SP1OT, 9 SL
SWL:	SP–0237–WA, 49288

Right to left: CT4UE, CT4AT, our YL friend, Ines, N6TJ, CT1AOZ, and CT1BOH far in the back. (Photo by CT4NH)

PORTUGAL

Louis Miguel de Sousa CT4UE
PO Box 32
S. Joao do Estoril 2765
Portugal

Been out of Portugal several months and didn't have a chance to do a column. A couple of things happened! Wayne Green is back, and I missed "Never Say Die" while I was away!

Don Riebhoff—1942–1987

It is so sad when we have bad news like this. Don Riebhoff is a Silent Key. Don was a telecommunications officer for the American Embassy, assigned to Lisbon in 1985. He died in an automobile accident in Spain last January, on his way back to his post.

Who doesn't remember Don and his activities? By which I mean his DXpeditions and trips, trips to XU1DX, 1S1A, C31ME, G5BNL, ZB2DM, FM0FC, HS3DR, XV5AC (I worked him in 1973), HS4ABM, TI9CF, K7CBZ, CT4AT, and K7ZZ in the USA. We were in touch quite often—he lived seven miles from me on a 2500-acre farm (*quinta*, as we say) on a hill overlooking the Atlantic, 45 minutes from downtown Lisbon.

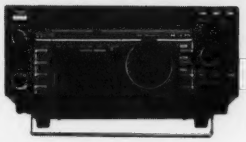
He had several antennas for low bands, like a two-element KLM for 80m, on an 80-foot crank-up tower, several Beverages for 160, and his big 4-element cubical quad was just ready to go up on a 100-foot tower. He signed CS0AT last year in the CQ WPX test.

Don was born in Detroit Lakes, Minnesota. He served in the US Army from 1964-66, working for Boeing for four years before and one year after his army service. He joined the foreign service in 1971, serving in Saigon, Phnom Penh, Lisbon, Antwerp, Prague and Baghdad. Memorial services were held in the US Embassy in Lisbon and at the State Department in Washington.

60 YEARS FOR REP

The 60th Anniversary of Rede dos Emissores Portugueses is being celebrated by an award available to licensed hams and SWLs worldwide for confirmed two-way (or heard) contacts with Portuguese stations CT1, CU (ex-CT2), and CT3, between January 26 and December 31, 1987.

All VHF and HF amateur bands, SSB, CW, mixed, RTTY, FM, no cross-mode allowed. European stations, EA8, CT3, EA9—60 points; African and American stations—40 points; Asian and Oceanian stations—20 points. Portuguese stations may be contacted only once per band; the same station may be contacted on different bands.



IC-735

IC-751A

TS-711
TS-811

TS-940S

μ2-AT

IC-02AT
IC-04AT

IC-R7000

TM-2550A
TM-3530A

TS-440S
TS-430S

TH-215A
TH-205A
TH-21BT
TH-31BT
TH-41BT

R-5000
R-2000

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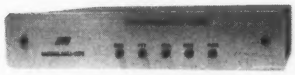

Isopole Antennas

Portuguese stations are worth one point each; the club station, CT1REP or CT6REP, count 5. No QSL cards, but send logs with date, time, callsign of station worked (heard), frequency, and mode. Provide your full name and QTH, and state clearly the endorsement for which you are applying. All applications must be countersigned by your national, IARU-member, society, to the effect that the QSL cards of the contacts are in the possession of the applicant and that the data are correctly listed. The separate awards are for each mode.

Awards are free to IARU-member club stations; others send 8 IRCs or US$4.00; address: Diploma 60th Anniversary of REP, PO Box 2483, 1112 Lisboa Codex, Portugal. Applications must be received on or before December 31, 1987.

That's it for now; a big Abraco for all of you, and see you next time. 73.■

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PROPAGATION

Jim Gray W1XU

EASTERN UNITED STATES TO:

GMT:	00	02	04	06	08	10	12	14	16	18	20	22
ALASKA						20	20					
ARGENTINA	20	20	20	40			20	20	15	15	15	15
AUSTRALIA		20	20	20	40	40	20					
CANAL ZONE	15	40	40	40	40[1]	40		15	15	15	10	10
ENGLAND			40[1]	40			20	20	20	20	20	20
HAWAII			20		40		20					
INDIA												
JAPAN						20	20					
MEXICO	15	40	40	40	40[1]	40		15	15	15	10	10
PHILIPPINES							20					
PUERTO RICO	15	40	40	40	40[1]	40		15	15	15	10	10
SOUTH AFRICA			40	40		20	20				20	
U. S. S. R.							20	20		20		
WEST COAST	20	40	40	40[1]	40[1]	40						20

CENTRAL UNITED STATES TO:

ALASKA		20	20					20	20			
ARGENTINA	15	20	20	40			20	20		15	15	15
AUSTRALIA	15	20	20	20	40[1]	40		20			20	
CANAL ZONE	15	20	20	20	40[1]	40	20	20	15	15	15*	10
ENGLAND	20	40					20	20		20	20	20*
HAWAII	15	15	20	20	20	40	20	20				
INDIA												
JAPAN		20	20					20	20			
MEXICO	15	20	20	20	40[1]	40	20	20	15	15	15*	10
PHILIPPINES		20	20				20	20				
PUERTO RICO	15	20	20	20	40[1]	40	20	20	15	15	15*	10
SOUTH AFRICA							20				20	20
U. S. S. R.								20			20	

WESTERN UNITED STATES TO:

ALASKA		20	20					20				
ARGENTINA	15	20	20	40	40			20	20		15	15
AUSTRALIA		20	20	20	20	40[1]	40[1]		20		15	15
CANAL ZONE	15	15	20	20[1]	40[1]	40		20	20	15	15	15
ENGLAND	20							20	20			20
HAWAII	20	15	15	20	20	20[1]	40[1]	40	20		20	20
INDIA				20					20			
JAPAN		20	20						20			
MEXICO	15	15	20	20[1]	40[1]	40		20	20	15	15	15
PHILIPPINES				20					20			
PUERTO RICO	15	15	20	20[1]	40[1]	40		20	20	15	15	15
SOUTH AFRICA			40						20			
U. S. S. R.									20			
EAST COAST	20	40	40	40[1]	40[1]	40						20

Many DX opportunities will present themselves in July as the bands stay open longer, but high atmospheric noise levels and the possibility of many days with an unsettled to active magnetic field will limit the otherwise improving conditions. While solar flux is up and improving, magnetic-field upsets detract form the good news. I'd be on the lookout for excellent VHF opportunities on the days that the HF bands are the worst. Remember that named days/conditions could be off by a day or two.

JULY

SUN	MON	TUE	WED	THU	FRI	SAT
			1 G	2 F	3 F–P	4 P
5 P–F	6 F–G	7 F–P	8 P	9 P	10 P	11 P
12 F	13 F–G	14 G	15 G	16 G	17 G	18 G
19 G	20 G	21 G	22 G–F	23 F	24 F–G	25 G
26 G–F	27 F–P	28 P	29 P	30 P	31 P–F	

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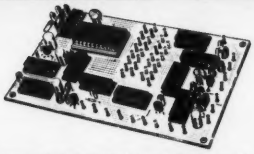

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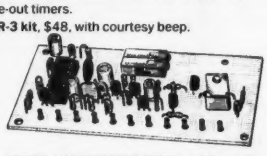

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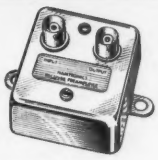

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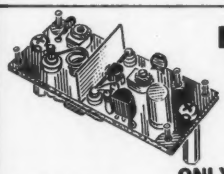
- **Wide Dynamic Range:** to resist overload
- **Stable:** new-type dual-gate GaAs FET

* Specify tuning range desired: 26-30, 46-56, 137-150, 150-172, 210-230, 400-470, or 800-960 MHz.

LNW -(*) MINIATURE GaAs FET PREAMP

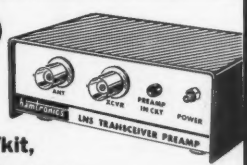


Unbelievably Low Price ---
ONLY $19/kit, $34 Wired/tested

GaAs FET Preamp similar to LNG, except designed for **low cost & small size.** Only 5/8"W x 1-5/8"L x 3/4"H. Easily mounts in many radios.

* Specify tuning range desired: 25-35, 35-55, 55-90, 90-120, 120-150, 150-200, 200-270, or 400-500 MHz.

LNS-(*) IN-LINE PREAMP

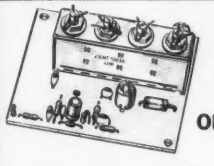


ONLY $59/kit, $79 wired/tested

GaAs FET Preamp with features similar to LNG series, except **automatically switches out of line during transmit.** Use with base or mobile transceivers up to 25W. **Tower mtg. hardware supplied.**

* Specify tuning range desired: 120-175, 200-240, or 400-500 MHz.

HRA -(*) HELICAL RESONATOR PREAMP



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Low-noise preamps with helical resonators **reduce intermod & cross-band** interference in critical applications.

* Specify tuning range desired: 143-150, 150-158, 158-162, 162-174, 213-233, 420-450, 450-465, or 465-475 MHz.

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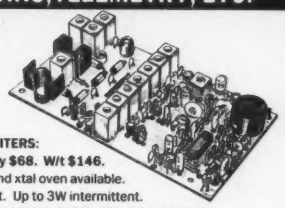

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- **TA451 for uhf.** FCC TYPE ACCEPTED FOR COMMERCIAL BANDS.
- **VHF & UHF LINEAR AMPLIFIERS.** For FM or SSB. Power levels from 10 to 45 Watts. Several models, kits starting at $78.

- **R144/R220 FM RCVRS** for 2M, 150-174, or 220 MHz. 0.15uV sens, 8-pole xtal & 10 pole ceramic i-f filters, helical resonator front end for exceptional selectivity, >100dB at ±12kHz (best available anywhere!) Flutter-proof squelch. AFC tracks drifting xmtrs. Xtal oven avail. Kit $138, w/t $198.
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RECEIVING CONVERTERS

		Antenna Input Range	Receiver Output
VHF MODELS		28-32	144-148
		50-54	28-30
		144-148	144-148
Kit with Case	**$49**	146-147	28-30
		144-144.4	27-27.4
Kit less Case	**$39**	146-148	28-30
		220-222	28-30
Wired w/case	**$69**	220-224	50-54
		222-224	28-30
UHF MODELS		432-434	28-30
		435-437	28-30
Kit with Case	**$59**	432-438	144-148
		432-435	50-54
Kit less Case	**$49**	439.25	61.25
		902-928	422-448
Wired w/case	**$75**	902-922	430-450

TRANSMIT CONVERTERS

		Exciter Input Range	Antenna Output
For SSB, CW, ATV, FM, etc. Can be linked with receive conv for tranceive. 1 to 2 W out. Linear PA's available up to 50W.	For VHF Model XV2 Kit $79 Wired $149 (specify band)	28-30	144-148
		28-29	145-148
		28-30	50-52
		27-27.4	144-144.4
		28-30	220-222
		50-54	220-224
		144-148	50-52
		144-146	28-30
	For UHF Model XV4 Kit $79 Wired $139	28-30	432-434
		28-30	435-437
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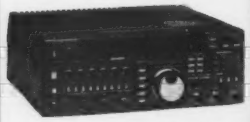

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- Add Optional 6m, 2m & 70cm Modules
- Dual VFO's
- Full CW Break-in
- Lots More Features

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- Commercial Grade HT's
- 5W Output
- Coverage 150-174 MHz 450-474 MHz
- Call For Low, Low Prices

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- 2M, All Mode Portable Transceiver
- Use Either 12V Battery (25W Output) or C-cell Battery Pack (2.5W Output)
- SSB, CW, FM
- Ten Memories, Dual VFO's
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- 5W Output
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- Memory And Priority Scanning
- FT-209RH - 2m
- FT-709RH - 440 MHz

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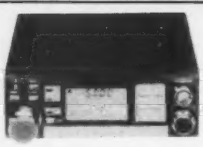
- 45W Output
- LCD Readout
- Ten Memories
- Also, FT-711RH For 440 MHz



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- 2m/70cm
- 25W Output
- True Full Duplex Operation

FL-7000

- Solid-State Amp For 160-15M
- Built-In Power Supply
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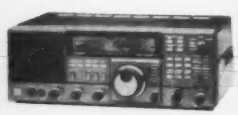
- And Lots More



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- General Coverage Receiver
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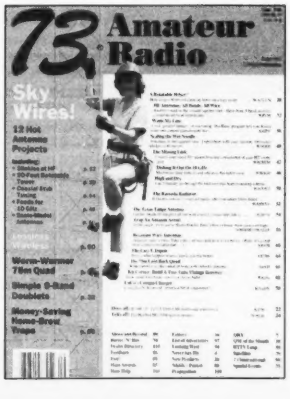

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TM-3530A—25 watts of 220 MHz FM—Kenwood style! Features include built-in 7-digit telephone number memory, auto dialer, direct frequency entry and big LCD. All this makes the TM-3530A the most sophisticated rig on 220 MHz!

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- Automatic repeater offset selection—**a Kenwood exclusive!**
- Direct keyboard entry of frequency
- 23-channel memory for offset, frequency and sub-tone
- Big multi-color LCD and back-lit controls for excellent visibility
- Optional front panel programmable 38-tone CTCSS encoder **includes 97.4 Hz**
- Frequency lock switch
- Digital Channel Link (DCL) option
- High performance GaAs FET front end receiver

- 16-key DTMF pad, with audible monitor
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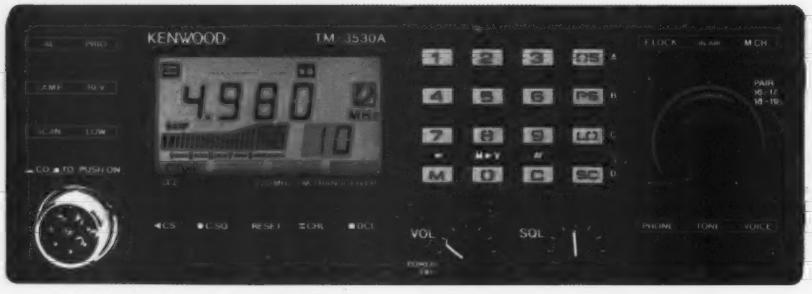

TM-3530A optional accessories:

- **TU-7** 38-tone CTCSS encoder
- **MU-1** DCL modem unit
- **VS-1** voice synthesizer
- **PG-2N** extra DC cable
- **PG-3B** DC line noise filter
- **MB-10** extra mobile bracket
- **CD-10** call sign display
- **PS-430** DC power supply
- **MC-60A/MC-80/MC-85** desk mics.
- **MC-48B** extra DTMF mic. with UP/DOWN switch
- **MC-43S** UP/DOWN mic.
- **MC-55** (8 pin) mobile mic. with time-out timer
- **SP-40** compact mobile speaker
- **SP-50B** mobile speaker
- **SW-200B** SWR/power meter
- **SW-100B** compact SWR/power meter

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- BT Series has built-in tone
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- **Supplied accessories:** rubber flex antenna, earphone, wall charger, 180 mAH NiCd battery and wrist strap
- Quick change, locking battery case

TH-31BT/31A optional accessories:

- **HMC-1** headset with VOX
- **SMC-30** speaker microphone
- **PB-21** NiCd 180 mAH battery
- **PB-21H** NiCd 500 mAH battery
- **DC-21** DC-DC converter for mobile use
- **BT-2** manganese/alkaline battery case
- **EB-2** external C manganese/alkaline battery case
- **SC-8/8T** soft cases with belt hook
- **TU-6** programmable sub-tone unit
- **AJ-3** thread-loc to BNC female adapter
- **BC-6** 2-pack quick charger
- **BC-2** wall charger for PB-21H
- **RA-9A** StubbyDuk antenna
- **BH-3** belt hook

TH-31BT with DTMF pad shown. Optional RA-9A attached.

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